Cambridge Assessment

Supporting Primary Schools in Pupil Progress and Attainment

Lessons from research and practice around the world

Tim Oates CBE | *Group Director of ARD* | December 2018

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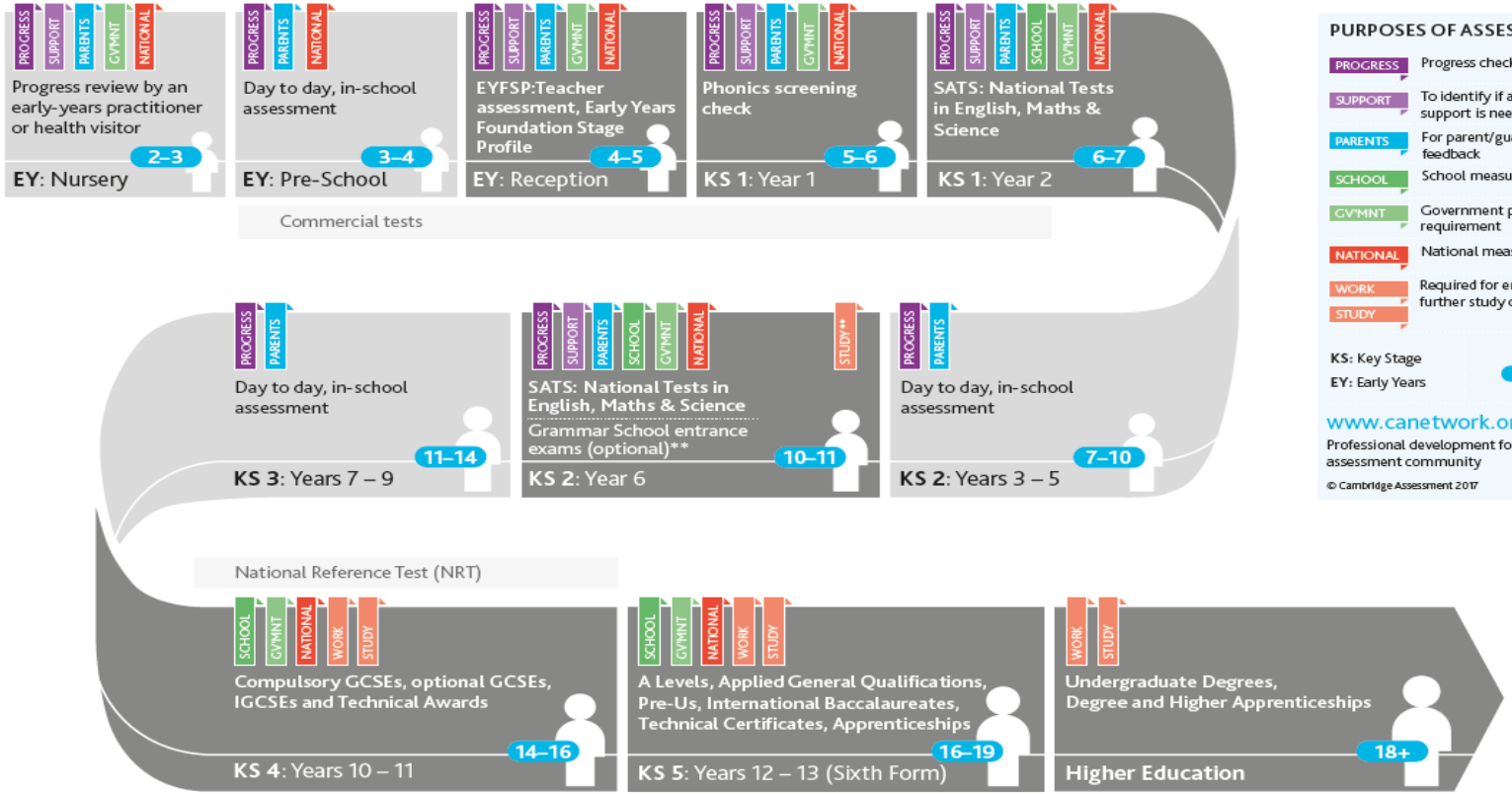
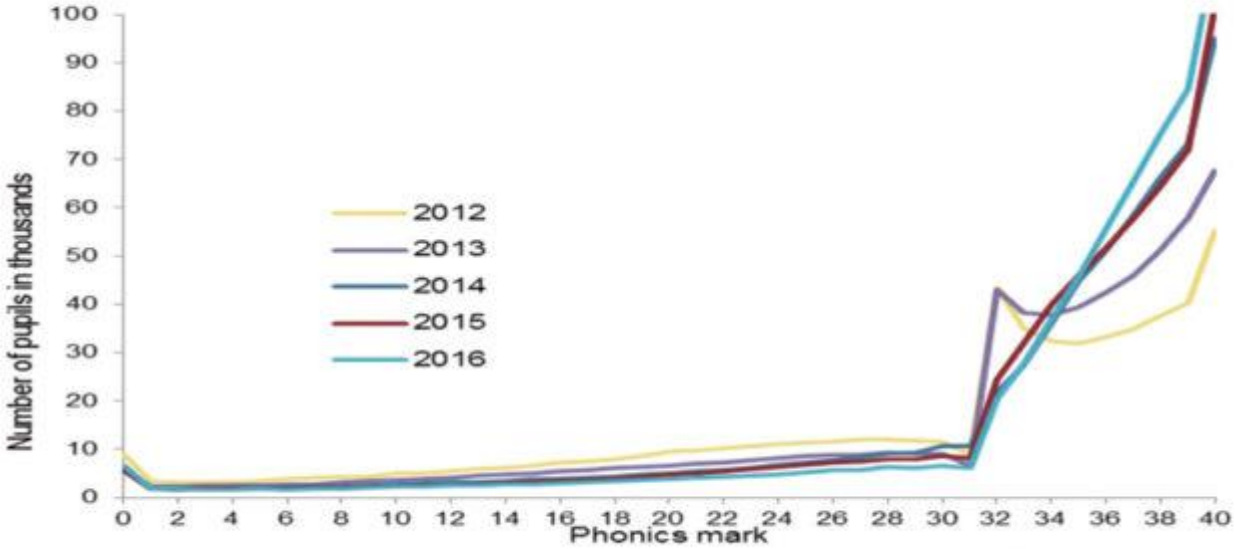
Purposes of assessment in the English education system



Phonics check

Phonics check needs rethink after data shows 'something dodgy' – Freddie Whittaker Schools Week 0710 2016

Figure 1: Year 1 phonics screening check mark distribution:
England, 2012 to 2016



Source: National Pupil Database

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Baseline Test

What will be assessed?

Schools will administer the assessment soon after pupils enter reception. It will be an activity-based assessment of pupils' ability in:

communication, language and literacy

early mathematics skills

We are also exploring whether **self-regulation** can form part of the assessment.

The assessment will be age appropriate, last 20 minutes and teachers will record the results. It will not be used to judge, label or track individual pupils.

Contemporary comment: attacking too soon…

What Gibb does not mention is that the overwhelming evidence is that assessments at this age, especially if they are quick and simple, are unreliable. Results are heavily dependent on how old the child is; they cannot make accurate assessments in the case of children who speak English as a second language. This makes them particularly unsuitable for use as instruments for accountability, by which Gibb means rankings or league-tables of schools.

Gemma Moss, Harvey Goldstein, Pam Sammons, Gwen Sinnott and Gordon Stobart Friday 4 May 2018

Some false dichotomies

Formative assessment	Low stakes
Summative assessment	High stakes

Pupil A and pupil B – Maths GCSE grade 'predictions'

Pupil A – level 4 – no entry testing – KS3 weak on assessment – poor test prep – low score – predicted 5
Lower tier route

Pupil B – level 4 – no entry testing – KS3 weak on assessment – poor test prep – low score – predicted 5
Lower tier route

Low quality primary provision in maths

Tracking systems can lock in low expectations
Opportunity to Learn (OTL) Bill Scmidt – self fulfilling low demand reduced curriculum experience
Statistical creation of low expectations and low performance but just meeting targets
Continuation of orthodoxy of 'borderline grade C' targetting behaviour

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Many are reluctant to ask questions out of fear of failure

An ice cube floats in a glass of water

Will the level of water in the glass rise when the cube melts?

How many trees does it take to make one edition of the New York Times?

Enrico Fermi

Many are reluctant to ask questions out of fear of failure

What's the difference between 'gas' and 'smoke'?
Did Shakespeare have a sense of unconscious motivation?

Discussion questions
Diagnostic
Hinge-point
Exit pass

Underneath the **deployment** of these are principles (explicit/implicit) regarding:

the extent of practice
variation theory for the purpose of learning
repetition for moving ideas into long term memory
extent and depth of understanding- tracing points of breakdown
the structure of knowledge (there are such things as 'subjects')

Understanding what's going on inside a child's head

Intrusive

Ideas of powerful knowledge – important issues of epistemology and ontology

Moving from 'common experience' to profound counterintuitive knowledge and behaviour informed by this knowledge – Hidden Figures, Soviet Maths

Uncomfortable (affect) – requires deep engagement & concentration (cognitive re-orientation)

Constructs and constructivism – naïve constructivism re 'authentic experience of the child'; 'discovery learning'

Production

Vicki Crisp

Learning to pass
Learning
Learning to learn

TEACHER TYPES

AMIRA
Maths - Pakistan

OLIVIA
Science - Spain

ERIK
Maths - Serbia

CONFLICTED
(too much to cover)

QUESTION FOCUSED

IDEA FOCUSED

You can see Venus, Jupiter and it's dark – where are they?

Rich questions

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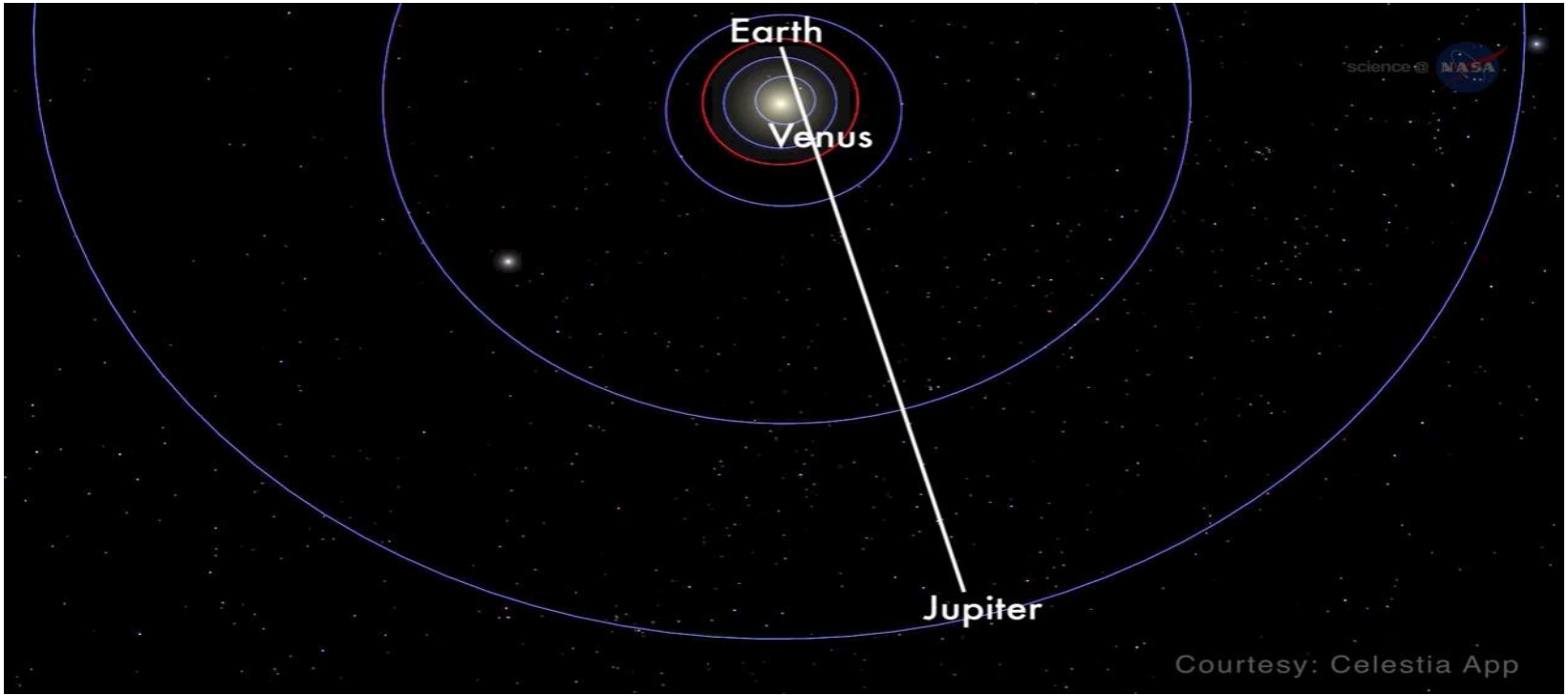
You can see Venus, Jupiter and it's dark – where are they?



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Constructs…knowing, doing, understanding

Spectrum
Frequency
Colour
Reflection
Absorbtion

A question
Blue things reflect blue light and absorb the rest of the spectrum
Red things reflect red light and…

Questions

The electron
Charge
Properties of substances
Chemical combination
Electrical energy

Questions we ask and the answers we expect (item and marking/response frame)
What we do with the outcomes and the feedback we give
Mastery

Revealing misconceptions
Depth of treatment
Supporting thinking

But I looked in the archive … and it just had questions....

Polish and re-use – Rong Fang; Stigler; Christodoulou; Warner & Jardine-Wright

1923
1601
403

Quantum – crowd-sourced assessment
Flooding as a means of avoiding instrumentalism & encouraging 'intelligent practice'

Select Committee evidence January 2017

…We are the most tested system in the world

…Only, we aren't

…Only we have high accountability

…In fact, we really aren't the only ones

…High density assessment and accountability are not associated with 'improving systems'

…Actually, they are

We need more assessment of a different kind

The Game

From Inside the Black Box

-Wait long enough and the teacher will tell you the answer – pupil perspective
-I have to move fast because there's so much to go through – teacher perspective
-Pace, pace – Ofsted myth
-We must demonstrate progress – school leader perspective

-Boaler on maths
-Cunninghan on quiet reflection
-Lisa Jardine Wright on first year Physics at Cambridge

Impediments to improvement

- Interference with need fulfilment
- Selective perception
- Habit
- Inconvenience or loss of freedom
- Economic implications
- Security in the past
- Fear of the unknown
- Threats to power or influence
- Knowledge and skill obsolescence
- Organisational structure
- Limited resources

Resistance to change and ways of reducing resistance in educational organisations
Yilmaz D & Kilicoglu 2013

Teaching is exceptionally complex

Ted Wragg & Caroline Wragg

Dreyfus & Dreyfus

-Unconscious incompetence
-Conscious incompetence
-Conscious competence
-Unconscious competence

'… You can't teach an old dog new tricks…'
'….Old habits die hard…'

Evidence on novice performance in teaching – stress; why no textbooks?

False oppositions – bombarded by polar opposites

1 knowledge versus skills

2 subjects versus themes

3 abstract versus concrete

4 rote learning versus understanding

5 didactics versus pedagogy

6 teacher-led versus individualised learning

7 assessment versus learning

Curriculum - the desirable outcomes of education

1. Discipline-specific knowledge, skills and understanding in broad range of disciplines
2. Orientation to learning, 'learning to learn'
3. Physical and mental well-being
4. Personal and social identity
5. Personal dispositions and attitudes (Bynner et al)
6. Social networks and relationships (Schuller et al)
7. Cultural capacity
8. Moral, civic and political understanding, including international awareness

9. Facility in technology

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Locating aims, content and outcomes – *what* do we put *where* in the curriculum?

Taught curriculum – subjects
Taught curriculum – cross curriculum elements
'Taught' curriculum – extra-curriculum elements
Expected activities outside school: school-home linkage – homework, parental support

Extra-curriculum elements – guided (school trips, link activities etc) unguided (student clubs etc)

Institutional participation – student councils etc, learner voice
Support elements – Information Advice and Guidance (IAG) etc

Ethos – values and value-driven practices
Culture – lived experience of the institution
Impact of incentives and drivers – eg labour market pressures, identity

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‘Curriculum’

Aims	Singapore, Hong Kong, Finland, Alberta
Content	Transnational comparisons of scope, sequencing and framing
Methods	Models of ability, complexity (Stigler and Stevenson)
Assessment	Formative and summative
Evaluation	Shanghai

After Michael Eraut

Curricular and extra-curricular

Taught and untaught curriculum

Unstated curriculum (ethos, culture)

The constructed curriculum

Ability models

Progression models

Curriculum coherence

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Schmidt - TIMMS

Intended curriculum

Enacted curriculum

Assessed curriculum

Learned curriculum

Hattie, EEF, Coe, Crehan

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Curriculum 2014 – more than a shift in content

- Powerful knowledge – counterintuitive focus of powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- Contextualisation controlled by teachers
- A focus on constructs
- Removal of levels
- New models of ability
- Different concepts of progression
- Scale score (triage)
- Competence in reading, wide reading for pleasure
- Oracy

- Production; higher quality formative assessment

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‘Stand out element – ability models and pedagogy

Concentration on a **small number of attainable goals**, mostly of an academic variety or concerned with the individual’s relationship to society, rather than a spread of effort across many academic, social, affective and moral goals.

Mechanisms to ensure that **things are taught properly the first time around**, and that there is no ‘trailing edge’ of children who have to be returned to later (an example from Taiwan is that children have to repeat in the homework books any exercises that they got wrong in their previous homework).

The use of the **same textbooks by all children**, which permits teachers to channel their energy into classroom instruction and the marking of homework, rather than into the production of worksheets that is so much a feature of English teaching.

Reynolds and Farrell *1996 p56*

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The importance of the 'aims' statements

Purpose of study

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject

.

The importance of the 'aims' statements

The national curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non- routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The importance of the 'aims' statements

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Information and communication technology (ICT)

Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. In both primary and secondary schools, teachers should use their judgement about when ICT tools should be used.

Spoken language

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

School curriculum

The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage, if appropriate. All schools are also required to set out their school curriculum for mathematics on a year-by-year basis and make this information available online.

Aims and content statement - Estonia

The aim of mathematics education is to develop in basic school students mathematics competence, which is adequate for their age; it means the ability to use the language, symbols and methods characteristic of mathematical applications to solve various problems in mathematics as well as in other school subjects and walks of life, to understand social, cultural and personal meaning of mathematics; the skill to formulate problems, identify and implement suitable solution strategies, analyse solution ideas and test the accuracy of results; the skill of logical reasoning, justification and proof by using and understanding different presentation methods.

The number of weekly mathematics lessons per stage of study is divided as follows: 1st stage of study – 10 lessons per week; 2nd stage of study – 13 lessons per week; 3rd stage of study – 13 lessons per week

Cultural and values – self-management – learning to learn

Aims and content statement - Estonia

2.1.4. Learning Outcomes and Learning Content of Mathematics in the 1st stage of study
The students:

Calculation Learning Outcomes

1) read, write, order and compare natural numbers from 0 to 10,000;
2) present a number as the sum of units, tens, hundreds and thousands;
3) read and write ordinal numbers;
4) add and subtract up to 100 mentally and up to 10,000 in writing;
5) recite the multiplication table (multiply and divide with a one-digit number up to 100 mentally);
6) know the names of the components and results of the four arithmetic operations;
7) find the numerical value of a letter in equations by means of trying or on the basis of analogy; and
8) determine the correct order of operations in expressions (parentheses, multiplication/division and adding/subtracting).

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2014 National Curriculum Maths Year 1

1. Number - addition and subtraction

1. Pupils should be taught to:

- read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including 0
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? − 9

Models of progression and ability

While much attention has been paid to the Confucian ideal (emphasising effort rather than ability) embedded in Asian systems, a model where differentiation is a finishing point rather than a starting point, and is seen as undesirable in the Primary phase, is an important part of arrangements in: Finland, France, Netherlands, Switzerland, Korea, Taiwan, Hong Kong, Japan and Singapore. While it is vigorously enforced in Korea, it manifests itself more subtly in Finland through processes such as all students, of any ability, having dedicated 'catch-up' support, even after very short periods of absence. In some countries it is a shared, explicit strategy with moral connotations, and is enforced by explicit policy. In others, it is a more implicit strategy, embedded in ingrained practices and processes. But despite these difference in form and expression, detailed transnational comparison shows its extreme importance

Clever Lands

The secrets behind the success of the world's education superpowers

'thought-provoking... a must-read'
Sir Clive Woodward

'a major breakthrough'
Sir Michael Barber

LUCY CREHAN

With a foreword by Tim Oates, CBE

‘The other important point to emphasise is the feedback. Practising at length is not useful, and can even be harmful, if you’re practising in the wrong way. Chinese teachers make the most of their extra non-teaching time to offer feedback to pupils in three ways. Firstly, they will often mark the students’ classwork and homework on the same day it’s handed in, using a set of symbols to indicate what the students got wrong so the students get immediate feedback. This doesn’t always happen; in some schools I saw students in the staffroom marking their peers’ work using the mark scheme, but this still gives the teacher an idea about distribution of mistakes, which they can use in their planning.

Secondly, they discuss common mistakes or misunderstandings at the beginning of the very next lesson, and ask students who got the tricky questions to demonstrate how they did it on the board to the rest of the class. On one occasion a maths teacher was hesitant to let me observe her class because, she said, ‘we’re only going over homework’, yet this is probably where the most learning gains happen’.

Lucy Crehan, Cleverlands (p.183), 2016

Levels – serious well-evidenced problems

3 contrasting, co-existing models

1 the score on a compensation-based test

2 best fit

3 threshold

Poor construct integrity – including subject differences

John Blake's research on predictive validity in post-16 progression

Contradictions between school and State

Poor communication with parents

Undue pace – expectations of Ofsted

Labelling – contrary to TGAT

Corrosive of primary secondary links

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WOWS Project (With Others We Succeed) – a focus on marking practices

1 no meaningless summarisation – no 'levels' – a construct focus

2 immediate feedback and action

3 production – a focus on pupil work

4 effective assessment is more than marking

5 meaningful, manageable and motivational

6 parental understanding – all actors agreeing on approach and action

Report soon to be available.

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Rich questions – how whole-class teaching can be highly individualised

What's multiplication - Wroxham

The story of the lesson – Shanghai &Japan

120 questions – Crehan

The protruding nail will be hammered in – Japan

Production

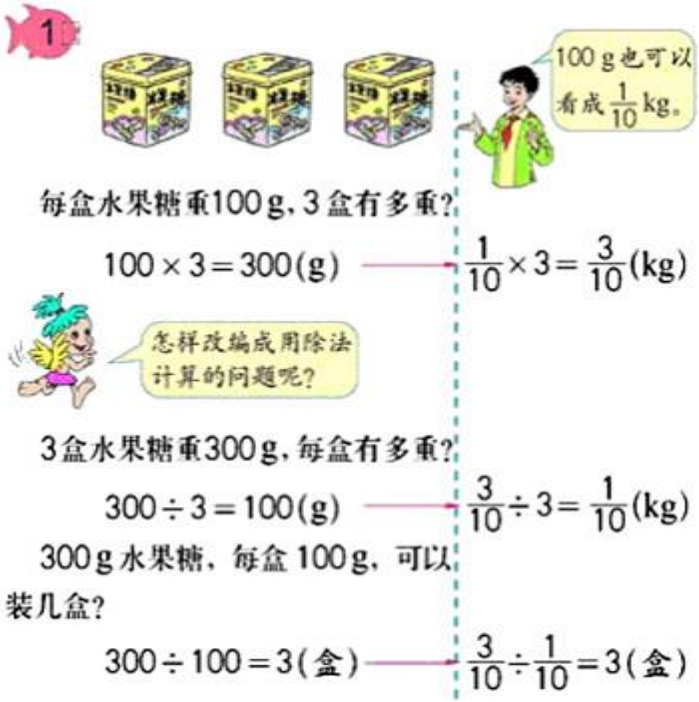
The externalisation of thinking

Making thoughts an object of study for the pupil

Revealing pupils' thinking to teachers

Complex language

Extended writing



Shanghai: interesting issues of sequencing; and research-based production and refinement of textbook material

Purpose

Construct focus
Production
Practice
Exposure

Conveying depth of treatment

Pre-assessment – on-going assessment – summary assessment classroom questions

Feedback to learner, teacher, parent
Progress check
Concept check – misconceptions

Granular analytic assessment
Focus on summary and 'grades'

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Approval of KS1 and KS2 maths textbooks

Two sets of textbooks approved

For curriculum support to Maths Hub schools, accessing matched funded

Small step variation

Constant questionning to detect underying understanding

Extended practice

Detection of persistent learning

Reinforcement and re-visiting concepts and operations

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Singapore secondary textbook

Chapter overview – story, topic – engagement
Discover – learning outcomes
Use of diagrams explained

Key ideas – concepts/constructs – margin notes – focus on concepts

Worked examples
Did you know – interesting facts
Guidance on the use of a calculator
Exercises
'Time out activity'
Journal writing task
Summary – recap and revision – checking main concepts
Revision paper
Ten-minute concept check
Review paper
Enrichment maths

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Hong Kong Secondary Maths textbook

Pre-requisites
Review

Different forms of the equations of circles
Features of circles from the equations
Equations of circles from the different given conditions
Intersection of a straight line and a circle

Learning objectives
Problems
Check through assessment: 6 problems, 1 practice exam Q, 1 *lively maths problem*
Clear concepts/constructs
Good elaboration through application
Checking understanding

Spiral curriculum model

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FRACTIONS

What fraction of this shape is shaded?

A $2/5$

B $3/2$

C $1/2$

D $3/5$

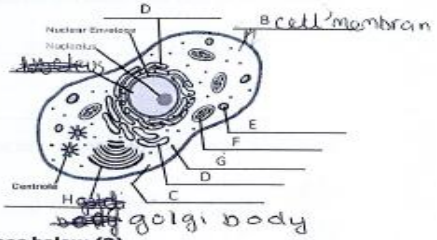
Recap Quiz

1/1 **1) What are all living things made out of? (1)** Cells ✓

2) Complete the table below filling in the names of each labelled organelle (8).

6/8

	Name of organelle
A	Nucleus ✓
B	Cell membrane ✓
C	Cytoplasm ✓
D	~~Lysosomes~~ Lysosomes ×
E	
F	Mitochondria sp. ✓
G	Ribosomes ✓
H	golgi body ✓



3) Explain the functions of each organelle on the lines below (3).

0/3

a) Cell membrane: is the outside of a cell which is the line ×

b) Nucleus: is outside of the nucleous ×

c) Cytoplasm: is the goocy stuff. × What do they do?

4) Use a ruler to match the organelles below to their correct function (5).

0/5

Endoplasmic reticulum	This transports materials within the cell.
Ribosomes	This is the site of respiration in a cell.
Mitochondria ×	This is responsible for making proteins in cells
Golgi body	This packages and exports the proteins that the cell has made.
Lysosomes	This digests old parts of the cell and acts as a second line of defence.

5) Pick and answer ONE question from the list below (3).

a. Why is it important that sperm and egg cells have a nucleus?

b. Our muscles are made up of millions of muscle cells. Why do muscle cells contain many more mitochondria than other specialised animal cells?

c. Some molecules such as glucose, can pass easily through the cell membrane but other molecules, such as starch, cannot pass easily through the cell membrane? Why can some molecules pass through the cell membrane more easily than others?

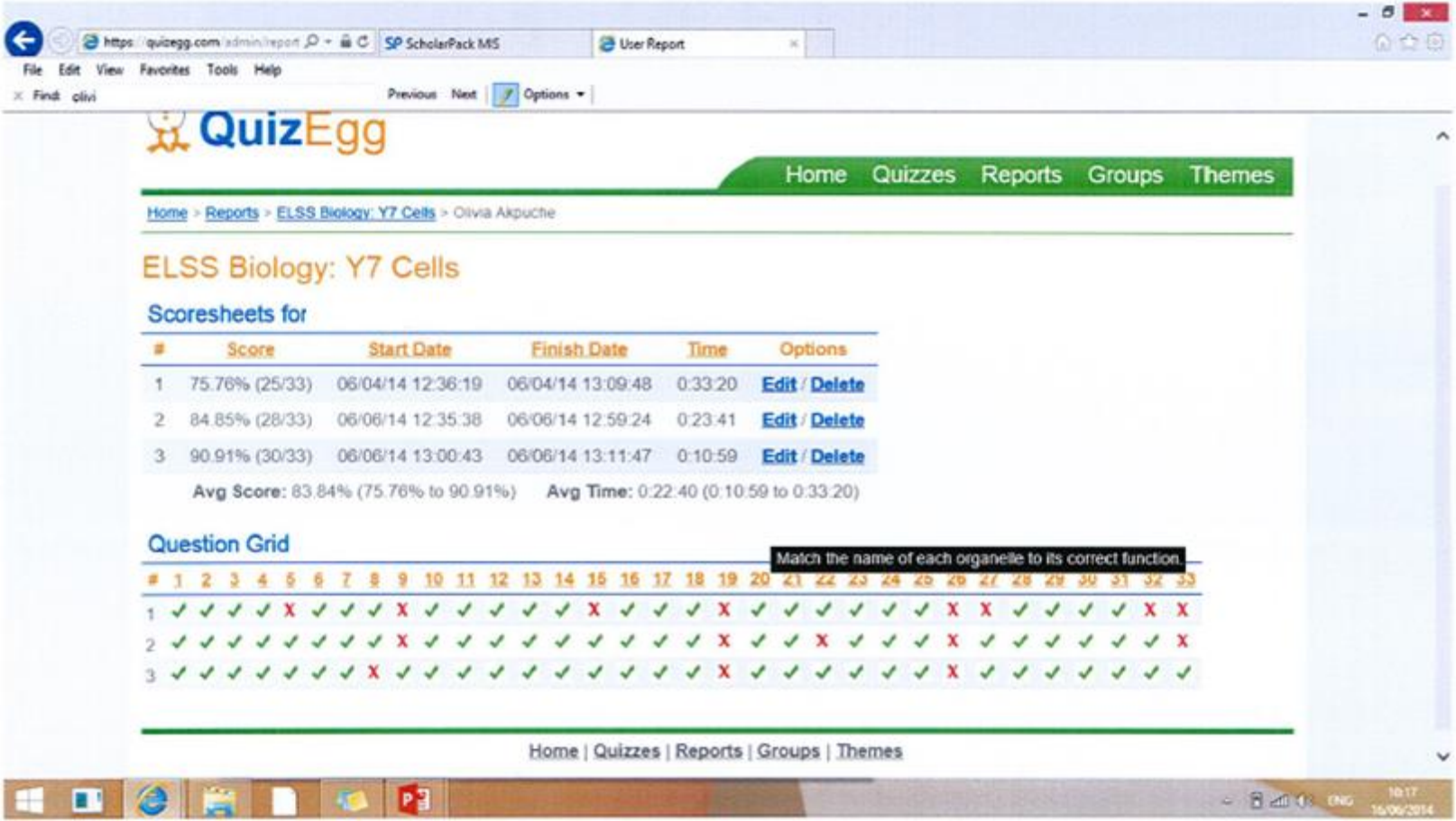
0/3

~~Because our muscle cells~~. So that when the egg goes inside the nucleas a baby can be made because it will have to bred inside.

Reuse = succeed!! Please redo incorrect answers!!

Yes miss

7/20


https://quizegg.com/admin/report
ScholarPack MIS
User Report
File Edit View Favorites Tools Help
Find: olivi
Previous Next Options
QuizEgg
Home Quizzes Reports Groups Themes
Home > Reports > ELSS Biology: Y7 Cells > Olivia Akpuche
ELSS Biology: Y7 Cells
Scoresheets for
Score Start Date Finish Date Time Options
1 75.76% (25/33) 06/04/14 12:36:19 06/04/14 13:09:48 0:33:20 Edit / Delete
2 84.85% (28/33) 06/06/14 12:35:38 06/06/14 12:59:24 0:23:41 Edit / Delete
3 90.91% (30/33) 06/06/14 13:00:43 06/06/14 13:11:47 0:10:59 Edit / Delete
Avg Score: 83.84% (75.76% to 90.91%) Avg Time: 0:22:40 (0:10:59 to 0:33:20)
Question Grid
Match the name of each organelle to its correct function.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
1 ✓ ✓ ✓ ✓ X ✓ ✓ ✓ X ✓ ✓ ✓ ✓ ✓ X ✓ ✓ ✓ X ✓ ✓ ✓ ✓ ✓ ✓ X X ✓ ✓ ✓ ✓ X X
2 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ X ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ X ✓ ✓ X ✓ ✓ ✓ X ✓ ✓ ✓ ✓ ✓ ✓ X
3 ✓ ✓ ✓ ✓ ✓ ✓ ✓ X ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ X ✓ ✓ ✓ ✓ ✓ ✓ X ✓ ✓ ✓ ✓ ✓ ✓ ✓
Home | Quizzes | Reports | Groups | Themes

Q: Stop the Train

A steam train moving with a speed of $v_0 = 60\ \mathrm{km\ h^{-1}}$ is brought to rest by first shutting off the steam, when the train runs against a resistance equal to $1/100$ of its weight, and later by applying the brakes, at which point the train runs against a force equal to $1/8$ of the weight of the train.

Answer Now | Hint 1 | Hint 2 | Hint 3 | Hint 4 | Hint 5

If the steam is shut off when the train is a distance $d = 0.33\ \mathrm{km}$ from a station, find the distance from the station that the brakes must be applied in order that the train may be brought to rest in the station.

Value ? Units

Please answer to an appropriate number of significant figures.

Please choose an appropriate unit of measurement.

Don't forget to use the **hint** tabs above if you need help.

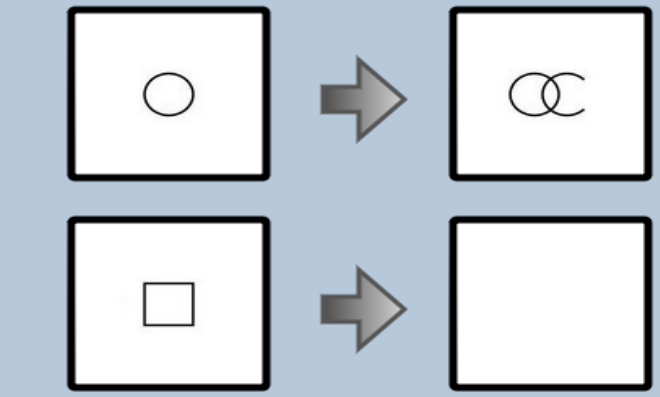
Check my answer

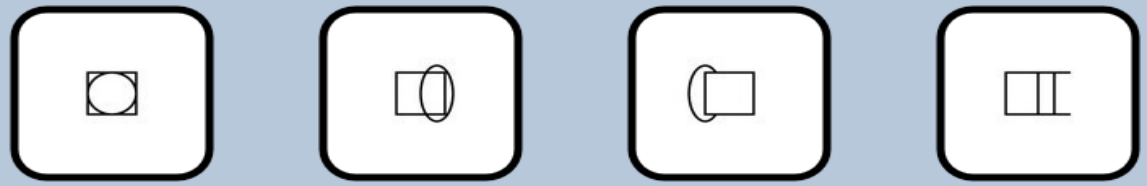
Adapted with permission from UCLES, Higher School Certificate Physics, June 1923, Paper 2, Question 1.

CIE demo50

Quiz question (3)

Look at the two shapes at the top. They go together in some way. Now look at the shape on its own. Find a shape that goes with the single shape in the same way the top two shapes go together.





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