

A world without levels



CAMBRIDGE ASSESSMENT

Tim Oates  
Group Director

Assessment Research & Development



UNIVERSITY of CAMBRIDGE  
Local Examinations Syndicate



# The National Curriculum 1995

## Science - key stage 3

### Materials and properties

#### Chemical Reactions

- i. that when chemical reactions take place, mass is conserved;
- j. that virtually all materials, including those in living systems, are made through chemical reactions;
- k. to represent chemical reactions by word equations;
- l. that there are different types of reaction, including oxidation and thermal decomposition;
- m. that useful products can be made from chemical reactions, including the production of metals from metal oxides;
- n. about chemical reactions, *e.g. corrosion of iron, spoiling of food*, that are generally not useful;
- o. that energy transfers that accompany chemical reactions, including the burning of fuels, can be controlled and used;
- p. about possible effects of burning fossil fuels on the environment.



## National Curriculum 2007

### Chemical and Material Behaviour

In their study of science, the following should be covered:

- a. chemical change takes place by the rearrangement of atoms in substances;
- b. there are patterns in the chemical reactions between substances;
- c. new materials are made from natural resources by chemical reactions;
- d. the properties of a material determine its uses.



## 2014 National Curriculum KS3 Chemistry

### The particulate nature of matter

- The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure
- Changes of state in terms of the particle model.

### Atoms, elements and compounds

- A simple (Dalton) atomic model
- Differences between atoms, elements and compounds
- Chemical symbols and formulae for elements and compounds
- Conservation of mass changes of state and chemical reactions



## Pure and impure substances

- The concept of a pure substance
- Mixtures, including dissolving
- Diffusion in terms of the particle model
- Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography
- The identification of pure substances.

## Chemical reactions

- Chemical reactions as the rearrangement of atoms
- Representing chemical reactions using formulae and using equations
- Combustion, thermal decomposition, oxidation and displacement reactions
- Defining acids and alkalis in terms of neutralisation reactions
- The pH scale for measuring acidity/alkalinity; and indicators
- Reactions of acids with metals to produce a salt plus hydrogen
- Reactions of acids with alkalis to produce a salt plus water
- What catalysts do.



## Materials

- The order of metals and carbon in the reactivity series
- The use of carbon in obtaining metals from metal oxides
- Properties of ceramics, polymers and composites (qualitative).

## Earth and atmosphere

- The composition of the Earth
- The structure of the Earth
- The rock cycle and the formation of igneous, sedimentary and metamorphic rocks
- Earth as a source of limited resources and the efficacy of recycling
- The carbon cycle
- The composition of the atmosphere
- The production of carbon dioxide by human activity and the impact on climate.



CAMBRIDGE ASSESSMENT

**The National Curriculum – School Curriculum distinction**

**The ‘powerful knowledge’ thesis**



## **In assessment, the concept of '*construct*' is vital**

Multiply three digit numbers

Understands and is inventive with metaphor

Reads a wide range of books for pleasure

Diffusion across a membrane

Understand the concept of percentage and calculate pc

Use the concept of inequality to analyse social relations

Understands conservation of mass

Measures accurately to quantify oxidation

Verbal reasoning

Externalising behaviour





## More than a shift in content

- **Powerful knowledge**
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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



## More than a shift in content

- Powerful knowledge
- **Fewer things in greater depth**
- National Curriculum and School Curriculum
- 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



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- **National Curriculum and School Curriculum**
- 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



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- **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



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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





## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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**



## More than a shift in content

- Powerful knowledge
- Fewer things in greater depth
- National Curriculum and School Curriculum
- 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

## More than a shift in content

- Not just some....all
- High attainment, high equity and high enjoyment



## Criteria relating to assessment – ‘*Cambridge Approach*’

### **Reliable**

consistent measurement

### **Valid**

measures precisely what it claims to measure

### **Sound construct base**

measures something consistent with curriculum aims

### **Consequential validity**

the uses to which the assessment is put are technically and ethically sound

### **Beneficial impact**

the full range of effects are beneficial

### **Utility**

cost, resource



# The Cambridge Approach

Principles for designing, administering and  
evaluating assessment

January 2009



## 2010 Levels

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





CAMBRIDGE ASSESSMENT

**Practice**

**Production**

**Exposure**



CAMBRIDGE ASSESSMENT

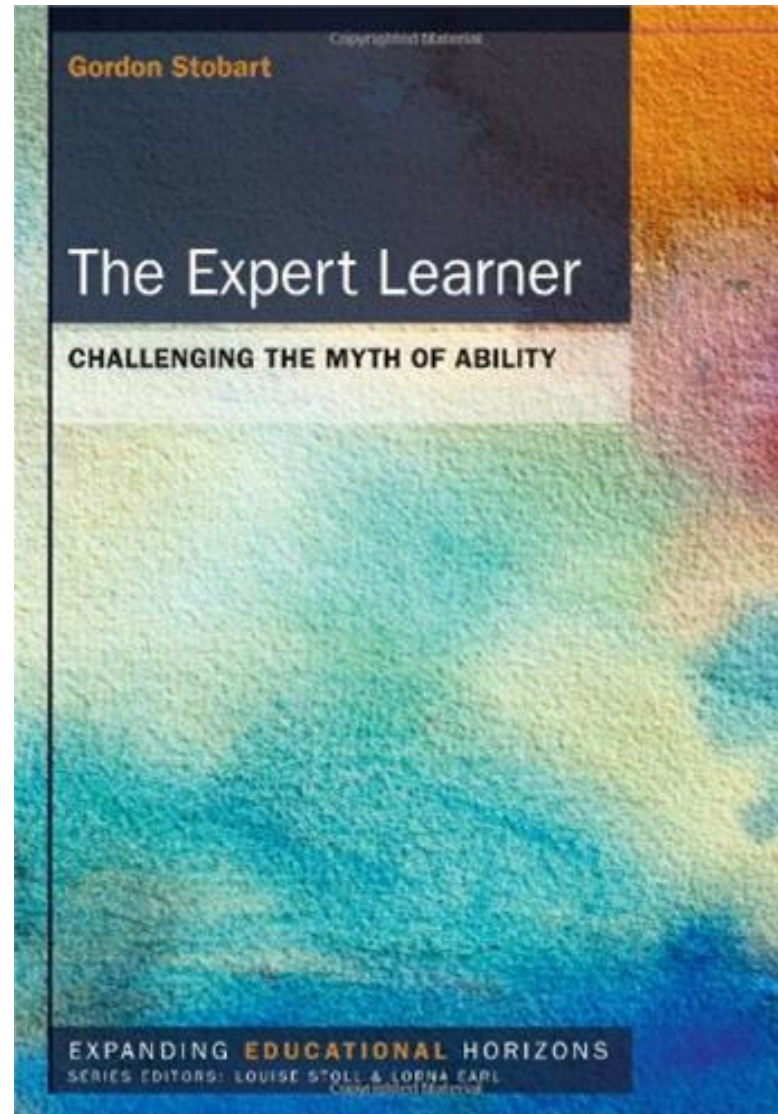
## Practice



CAMBRIDGE ASSESSMENT

**Practice** - expansive practice,  
not dull repetition

Thinking about the subject  
outside contact time



The National Curriculum for mathematics aims to ensure that all pupils:

Becoming **fluent** in the fundamentals of mathematics through regular and varied practice, so that they have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems; and

**reasoning mathematically** by following a line of enquiry and developing and presenting an argument, justification or proof using mathematical language

So that pupils:

Can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including within mathematics, in other subjects and from in and outside the classroom.



**Fluency** includes the rapid and accurate recall of mathematical skills and knowledge through regular and varied practice. To be mathematically fluent requires sufficient depth of conceptual understanding to be able to recognise when and how to apply existing knowledge.

**Mathematical reasoning** involves identifying and conjecturing about patterns, relationships, and generalisations; testing, evaluating, deducing, and justifying; and communicating ideas in mathematical language. It requires analysing information presented in different representations, recognising given information, identifying what additional information is needed and what forms of reasoning can provide it.

**Solving problems** that are not routine, within and outside mathematics, requires work and thought before mathematics skills and knowledge can be applied. It requires identifying structures, breaking down problems into a series of simpler steps; making decisions about how to acquire, derive or model new information; and showing perseverance in seeking out solutions.



The Programmes of Study are organised in a distinct sequence and structured into separate domains.

Teachers should ensure that pupils regularly practice and make connections across mathematical ideas to ensure fluency, mathematical reasoning and competence in solving increasingly sophisticated problems.

They should also apply their mathematical knowledge in science and other subjects.



## Hong Kong – secondary maths

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**



## **Singapore – secondary maths**

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





CAMBRIDGE ASSESSMENT

# Production



CAMBRIDGE ASSESSMENT

## Linking learning and assessment

Intended curriculum

Enacted curriculum

Assessed curriculum

Learned curriculum



CAMBRIDGE ASSESSMENT

## Production

The externalisation of thinking

Making thoughts an object of study for the pupil

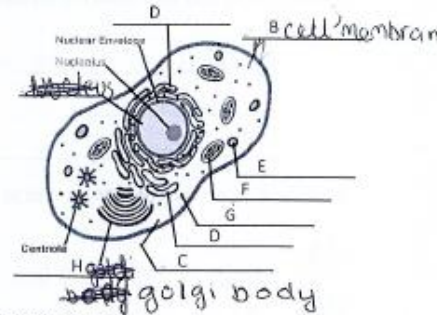
Revealing pupils' thinking to teachers



## Recap Quiz

- 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).

	Name of organelle
A	Nucleus ✓
B	cell membrane ✓
C	cytoplasm ✓
D	<del>lysosomes</del> lysosomes ✗
E	
F	Mitochondria ✓
G	Ribosomes ✓
H	golgi body ✓



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

- a) Cell membrane: is the outside of a cell which is the line ✗
- b) Nucleus: is outside of the nucleus ✗
- c) Cytoplasm: is the gooey stuff. ✗ *What do they do?*

- 4) Use a ruler to match the organelles below to their correct function (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?

03 Because our muscle cells. So that when the egg goes inside the nucleus a baby can be made because it will have to breed inside.

7  
20

Revise = succeed!! Please into correct answers!!  
Yes Miss

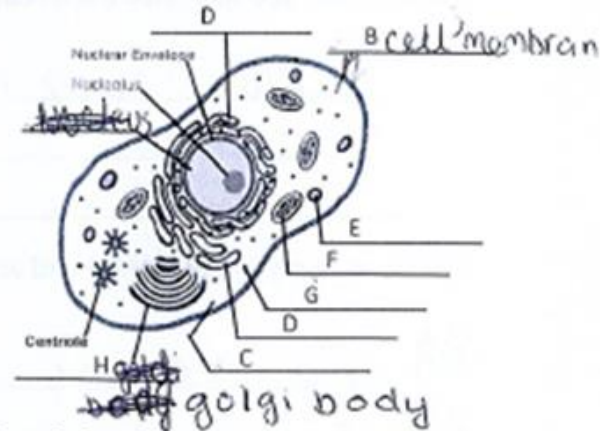
1/1

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).

	Name of organelle
A	Nucleus ✓
B	cell membrane ✓
C	cytoplasm ✓
D	<del>lysosomes</del> lysosomes ✗
E	
F	Mitochondria sq. ✓
G	Ribosomes ✓
H	golgi body ✓

6/8



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

- a) Cell membrane: is the outside of a cell which is the line ✗
- b) Nucleus: is outside of the nucleus ✗
- c) Cytoplasm: is the gooey stuff. ✗ What do they do?

0/3

## Reflection and Review

How many minutes did you spend preparing for the recap quiz (Answer honestly!)? \_\_\_\_\_

3 Things that you feel have gone really well so far this year in Biology:

I knew some of the <sup>parts</sup> ~~parts~~ of the cell  
\_\_\_\_\_  
\_\_\_\_\_

3 Barriers to my improvement and achievement in Biology this half term:

To revise alot and alot more  
to remember more of the cells  
Read questions properly.

3 Targets to help me improve further and achieve in Biology:

Give an answer even if I dont know it.  
Revise harder  
Remember parts of the cell and to read  
the questions properly

Teacher comment:

Www

you are beginning to detail more detailed and scientifically accurate answers. Well done.

ES1

\* Read questions carefully before answering them  
\* Respond to feedback to fill any gaps in your knowledge.

Student comment:

I ~~was~~ need to revise more and research  
it if I am stuck or ask the teacher.



ENT

Browser: <https://quizegg.com/admin/report> | SP ScholarPack MS | 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	<a href="#">Edit</a> / <a href="#">Delete</a>
2	84.85% (28/33)	06/06/14 12:35:38	06/06/14 12:59:24	0:23:41	<a href="#">Edit</a> / <a href="#">Delete</a>
3	90.91% (30/33)	06/06/14 13:00:43	06/06/14 13:11:47	0:10:59	<a href="#">Edit</a> / <a href="#">Delete</a>

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
3	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓

Home | Quizzes | Reports | Groups | Themes

Windows Taskbar: 16:17 16/06/2014



CAMBRIDGE ASSESSMENT

## **Problems in UK assessment**

Underdeveloped formative assessment  
Assessment dominating curriculum thinking  
Relentless transformation into high stakes  
Creep in function  
Escalation of purposes





CAMBRIDGE ASSESSMENT

## **Developing a school assessment scheme**



## 1

### **The purposes of assessment and the uses of assessment information produced by the school**

How the school identifies key constructs, how it chooses appropriate assessment approaches, and the ethics and practices around the use of the outcomes from assessment. The importance of ensuring high validity in assessment – ie a clear and concerted focus on key constructs and avoidance of ‘construct irrelevant variance’ (focusing on and giving credit for things which are not the principal thing of interest – don’t mark the appearance of work if you are interested in the idea being learned).

## 2

### **Models of ability, learners’ conceptions of themselves as learners**

The school’s ideas regarding ability and how assessment supports learning; how assessment feeds into pupils’ own views of themselves. This relates to rationale for any grouping, setting and streaming; how teachers encourage ‘self referencing’ in pupils rather than pupils always comparing themselves to others; avoiding ideas of fixed ability and using an idea of ‘all children being capable of anything as long as it is presented to them in the right way’.



### 3

#### **Governance, management and evaluation of assessment**

Where the responsibility for assessment policy is located, how development and operation of assessment is managed (policy on sharing and using assessment outcomes); how practices of teachers and the overall approach is evaluated (technical quality, impact etc) – it is vital to list the criteria by which the effectiveness of assessment is judged by the school.

### 4

#### **The approach to encouraging pupils to ‘produce’**

If children are highly ‘productive’ – written things (text, diagrams, etc), spoken things (statements and answers), then these ‘products of thinking and skills’ become an object on which they can reflect, their own thinking becomes clearer, and teachers can make judgements on their development, including webs of cause and effect, misconceptions, misunderstandings and novel ideas. The scheme should outline the schools’ approach to this and how it applies to all children.



## 5

### **Rich Q&A**

Probing questions are vital, both teacher to pupil, pupil to teacher and pupil to pupil. The new National Curriculum emphasizes oracy in every subject area, with evidence that this is linked to cognitive development.

## 6

### **Reporting to parents**

How assessment is used to inform parents of pupils' development and progress; how assessment is used to foster an effective home-school link, and to promote home learning

## 7

### **Choosing a benchmarking scheme and sticking with it**

Although value-added is important, what is crucial is an improvement of value-added over time – eg the trends over five years.



**8**  
**Use of commercial tests, other tests and assessment materials in text and work books and on-line assessments**

Rationale for using specific external commercial tests or similar, ensuring that such tests are well validated, are administered in line with the test protocols, and use of the outcomes and information from the test is well-grounded, ethical and beneficial. Part of the criteria for selecting learning materials and on-line resources should be the quality of the assessment materials – their measurement quality and the extent to which they match the school's programme.

**9**  
**SEN**

Research shows that teachers tend to underrate the ability of SEN children, particularly those with complex needs. The way in which a school will guard against this in its assessment practice is an important matter.



**10**

**Feedback to pupils**

Policy and practice on how assessment outcomes are fed back to pupils and the way in which it is expected to enhance learning.

**11**

**Target-setting**

The way in which targets are set for pupils, teachers and the school.

**12**

**Staff knowledge and CPD on assessment**

How the school ensure adequate understand of assessment and assessment practice amongst all teachers; how it keeps teachers up to date with developments in assessment; and how teachers bring good practice into the school



**13**

## **Use of assessment outcomes in institutional evaluation and development**

Policy on the use of attainment and other assessment data to evaluate teacher and institutional performance and to guide development.

**14**

## **Validation**

The way in which the school uses assessment information from different assessments to validate individual assessment instruments and the overall assessment policy and practice – eg looking at the relation between outcomes from tests of underlying ability (CAT, PIPS, VESPARCH) and curriculum-focussed assessment.

## The public goods of education

- Discipline-specific knowledge, skills and understanding in broad range of disciplines
- Orientation to learning, 'learning to learn'
- Physical and mental well-being
- Personal and social identity
- Personal capitals (Bynner et al)
- Social capitals (Schuller et al)
- Cultural capitals
- Moral, civic and political understanding, including international awareness
  
- Facility in technology





**2014**

**Benchmarking – a means of measuring progression (Bew recommendation)**

**Phonics check**

**KS2 tests**

Nick Gibb 2010 – ‘*..In Primary, apart from KS2 and the phonics check, I have no interest in the assessment which is done...*’

Be very careful to read this in the right way – it confirms the professionalism of teachers and deliberate contraction of the role of the State

High autonomy in formative assessment



CAMBRIDGE ASSESSMENT

**Constructs are all-important**



CAMBRIDGE ASSESSMENT

## Living in a levels-free world

Wroxham does it

Finland, Singapore do it

Soft landing as use decays

Focus on deep, secure learning of key constructs

Implement learning progressions (Schmidt and Prawat)

# The assessment landscape

consultation 11 Oct close



First teaching new National Curriculum from Sept 2014

In Primary a year by year statement of content

Each school publishing its school curriculum and assessment scheme

Levels no longer used

## Assessment model

Statutory tests at KS1 M&E – Summer 2016

Phonics screening check end of Yr1 – with cut score

Statutory tests at KS2 M&E (scale score and decile reporting)

Summer 2015 final KS2 test on existing curriculum

KS2 reported against prior attainment measure – baseline assessment

September 2015 reception baseline available

September 2016 reception profile only progress measure for accountability

Progress 8 and EBC driving qualifications choice

Non-modular GCSE conditioned by accountability measures

Non-modular A level

VQs

## My ideal

Educationally focussed measurement

Potent and valid formative assessment

Diagnostic assessment – CAT, PIPS, VESPARCH

High density, low weight

High autonomy in selection and use (assessment schemes)

A pull down bank of items

Independent measurement for monitoring national standards

A switch to high equity and high attainment through attainment measures not progress measures

No regression to thresholds (the grade D phenomenon)

Professionalisation of assessment expertise – use of local collaborative mechanisms for development and promotion of good practice – getting the right unit of collaboration