Mathematics
Assessment
Project

Assessment Tools for Implementing the Standards

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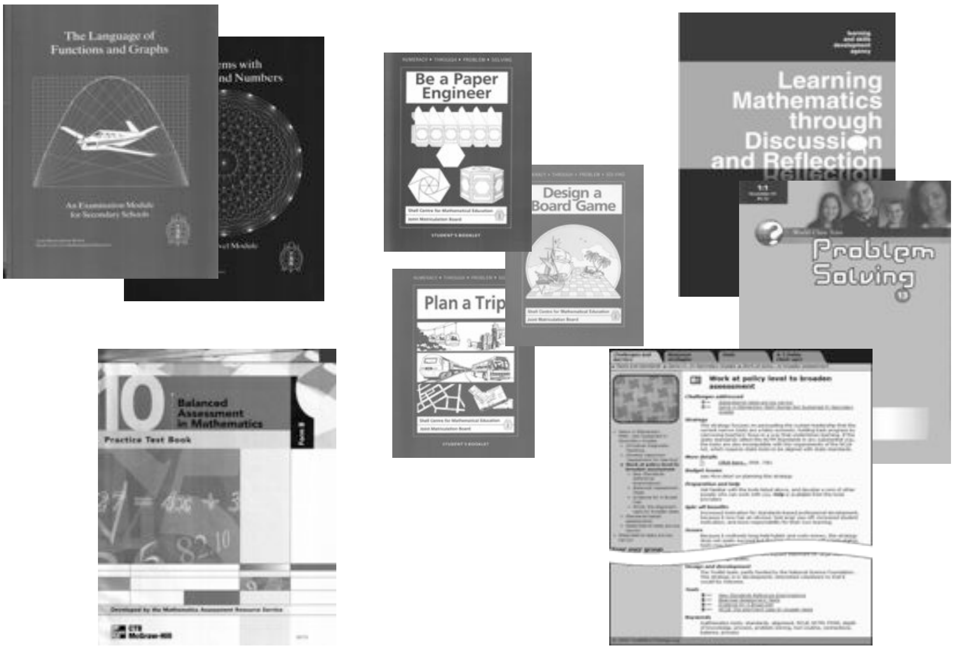


Why assess?

Formative *for learning*

- Diagnose difficulties and so inform teaching;
- Motivate learners by showing them what we value and what they still need to learn;

Summative *for reporting*

- Celebrate achievement, rewarding effort and success;
- Select learners for groups, courses, careers;
- Maintain records so that teachers or parents can be informed of progress;

Evaluative *for research*

- Assess teaching methods to see which work more effectively.

MAP products *all free for non-commercial use*

Goal: well-engineered tools to support those implementing CCSS

- Tools for Formative Assessment that:
  - make knowledge and reasoning visible
  - guide teaching responses

in the form of

  - Formative Assessment Lessons
  - Professional Development Modules
- Test Tasks
- Prototype Summative Tests

What are their roles?

- Test tasks
  - provide performance targets, epitomizing CCSS
  - assess overall achievement
- Formative assessment lessons
  - "stress test" student's integrated understanding
    "I thought if I taught them all the bits, they could put them together – I now know they can't" Trials teacher
  - diagnosis and treatment through
  - rich tasks that link standards
  - help teachers and students move reasoning forward
- Professional development modules

Methodology

Engineering research ~ design research + development into robust products

- Design principles for these purposes>
  - Design ideas, built on research insights & prior designs
  - Drafts for comment
  - Draft version for trialing (~piloting ~field testing)
    - Rich and detailed feedback from observers
    - Revision based on evidence
  - Iterate until outcomes match goals
- Release to the field, monitor feedback

Mathematical Practices: summary

"Proficient students expect mathematics to make sense.

They take an active stance in solving mathematical problems.

When faced with a non-routine problem, they have the courage to plunge in and try something, and

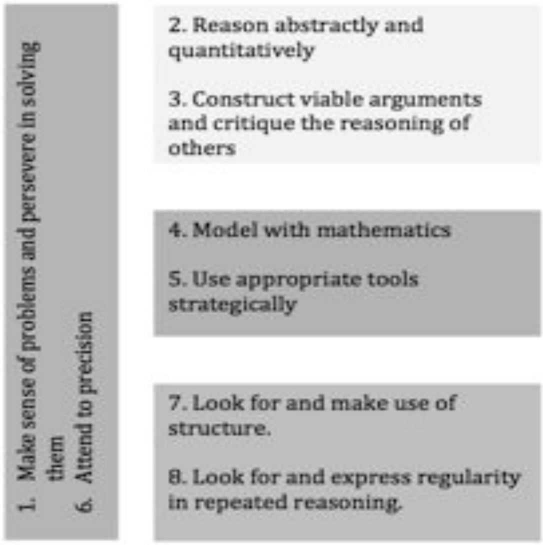
they have the procedural and conceptual tools to carry through.

They are experimenters and inventors, and can adapt known strategies to new problems.

They think strategically".

CCSS

Mathematical Practices



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Tasks and Tests

http://map.mathshell.org.uk/materials/

High-stakes assessment implicitly

- Exemplifies performance objectives
  - For most teachers, and the public, test tasks are assumed to exemplify the standards – so they effectively replace them
- Determines the pattern of teaching and learning
  - Teachers ‘teach to the test’

Taking the standards seriously implies designing tests that meet them: “Tests worth teaching to”

that enable all students to show what they can do

Formative assessment lessons help them do more

Tasks and the Mathematical Practices

It is useful to distinguish task types with increasing emphasis on mathematical practices

- **Novice Tasks**

  Short items, each focused on a specific concept or skill, as set out in the standards
- **Apprentice Tasks**

  Rich tasks with scaffolding, structured so that students are guided through a “ramp” of increasing challenge
- **Expert Tasks**

  Rich tasks in a form they might naturally arise – in the real world or in pure mathematics

Some novice tasks

6. Largest recorded earthquakes

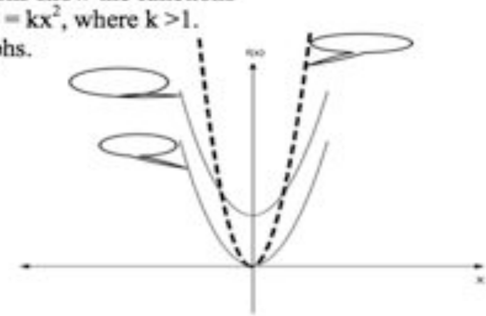
Location	Energy released in Joules
Santorini, Greece	3×10^{19}
Krakatoa, Indonesia	6×10^{18}

The Santorini earthquake was how many times as powerful as the Krakatoa earthquake?

8. For all positive integers, a * b = $\frac{a^b + 1}{a - 1}$. What is the value of 4 * 2?

12. By factoring the quadratic expression $x^2 + 3x - 4$, find the zeros of $f(x) = x^2 + 3x - 4$.

28. These three graphs show the functions $y = x^2$, $y = x^2 + k$, $y = kx^2$, where $k > 1$. Label the three graphs.



F-LE

29. One of these tables represents a linear relationship, one represents an exponential growth and one represents an exponential decay. Label each table correctly.

x	y
1	6
2	9
3	12
4	15

x	y
1	56
2	28
3	14
4	7

x	y
1	6
2	9
3	13.5
4	20.25

Expert tasks

Tasks in a form in which they might naturally arise

outside the math classroom or

in doing mathematics –

not predigested

Ponzi Pyramid Schemes

Max has received this email. It describes a scheme for making money.

From: A Crook
Date: Thursday 15th January 2009
To: B Careful
Subject: Get rich quick!

Dear friend,

Do you want to get rich quick? Just follow the instructions carefully below and you may never need to work again:

1. At the bottom of this email there are 8 names and addresses. Send $5 to the name at the top of this list.
2. Delete that name and add your own name and address at the bottom of the list.
3. Send this email to 5 new friends.

Ponzi continued

- If that process goes as planned, how much money would be sent to Max?
- What could possibly go wrong? Explain your answer clearly.
- Why do they make Ponzi schemes like this illegal?

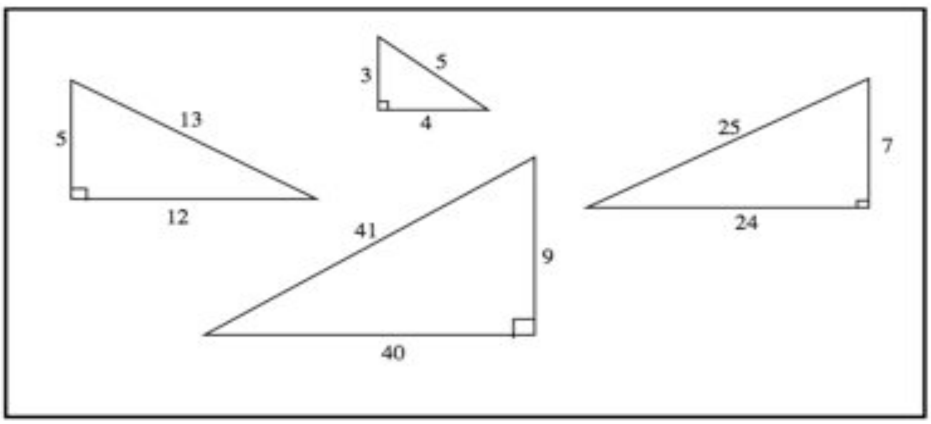
involves

Formulating the problem mathematically

Understanding exponential growth

Knowing it can't go on for ever, and why

PYTHAGOREAN TRIPLES



PYTHAGOREAN TRIPLES

(3, 4, 5), (5, 12, 13), (7, 24, 25) and (9, 40, 41) satisfy the condition that natural numbers (a, b, c) are related by $\mathbf{c^2= a^2+ b^2}$

- Investigate the relationships between the lengths of the sides of triangles which belong to this set
- Use these relationships to find the numerical values of at least two further Pythagorean Triples which belong to this set.
- Investigate rules for finding the perimeter and area of triangles which belong to this set when you know the length of the shortest side.

Apprentice tasks

- Expert tasks with added scaffolding to:
  - ease entry
  - reduce strategic demand
- Ramp of difficulty within the task, with increasing:
  - complexity
  - abstraction
  - demand for explanation

Balanced Assessment in Mathematics (BAM) tests are of this kind

Patchwork

This problem gives you the chance to:
- identify and extend a problem
- construct a rule or formula

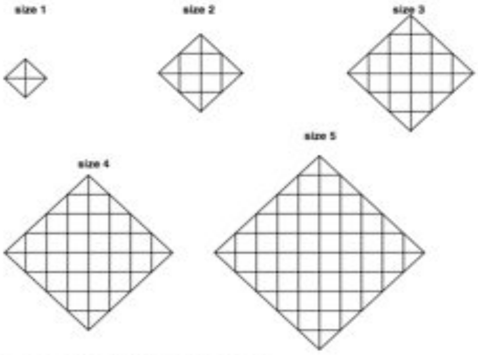
A sheet of square dot paper is provided for use with this item.

Kate makes patchwork cushions.

She uses right triangles  and squares. 

She uses triangles along the edges of each cushion. The rest is made from squares. The backs of the cushions are made of plain material, not patchwork.

Here are the first five sizes of patchwork cushions.



Kate makes cushions in many other different sizes.

She begins to figure out how many triangles and squares she needs for each size.

For size 1, she needs 4 triangles and 0 squares.

For size 2, she needs 8 triangles and 4 squares.

1. Complete this table to show how many triangles and squares she needs for each of these five sizes?

Size (n)	Number of triangles (t)	Number of squares (s)
1		
2		
3		
4		
5		

2. Find a rule, or a formula, that will help Kate figure out the number of triangles that she needs for cushions of different sizes. Explain how you figured it out.

3. Use the number patterns in the table to find a rule, or a formula, that will help Kate figure out the number of squares she needs for cushions of different sizes. Explain why your rule works.

4. Kate has a cushion made with 180 squares.
How many triangles are in this cushion?
Show how you found the number of triangles.

Apprentice tasks

guide students through a ramp of challenge

"Patchwork" gives:

- Multiple examples that ease understanding
- Specific numerical cases to explore – counting
- A helpful representation – the table

only then

- Asks for a generalization – rule, formula
- Presents an inverse problem

A step in growing expertise: "climbing with a guide"

Task Difficulty

The difficulty of a task depends on various factors:

- Complexity
- Unfamiliarity
- Technical demand
- Autonomy expected of the student

- **Expert Tasks** *fully involve the mathematical practices and all four aspects, so must not be too technically demanding*
- **Apprentice Tasks** *involve the mathematical practices at a modest level, with little student autonomy*
- **Novice Tasks** *present mainly technical demand, so this can be "up to grade", including concepts and skills just learnt*

On computer-based testing

Promises cheap instant adaptive testing

Great strengths but, even after 70 years, weaknesses

Key questions: for rich tasks does CBT provide

- Effective managing of the testing process?
- Better ways for presenting tasks?
- A natural medium for students to work on math?
- Effective ways to capture a student's reasoning?
- Reliable ways to score a student's responses?
- Effective ways for collecting and reporting results?

Strategic Design

Those aspects of design that relate to the interaction of the product with the system it aims to serve

see www.educationaldesigner.org issue 3

Poor strategic design is the main source of low impact and intended consequences

For tests, ask "Does this assess all the standards?"

If not balanced, demand better tests

Strategic design: testing disasters

1. The "tests are just measurement" fallacy
   In fact they dominate teaching and learning
2. Accepting cheap limited "proxy tests":
   eg multiple choice, computer adaptive
   They hold standards down to "novice" level
3. Criterion-based testing drive down standards
   It forces you to test the bits separately

.

Formative assessment lessons

http://map.mathshell.org.uk/materials/

Formative assessment is...

"… all those activities undertaken by teachers, and by their students in assessing themselves, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged. Such assessment becomes 'formative assessment' when the evidence is actually used to adapt the teaching work to meet the needs."

(Black & Wiliam, 1998 para, 91)

MAP Formative Assessment Lessons

- **Concept lessons**
  "Proficient students expect mathematics to make sense"
  - To reveal and develop students' interpretations of significant mathematical ideas and how these connect to their other knowledge.
- **Problem solving lessons**
  "They take an active stance in solving mathematical problems"
  - To assess and develop students' capacity to apply their Math flexibly to non-routine, unstructured problems, both from pure math and from the real world.

Principles for effective teaching

- Build on the knowledge learners already have.
- Expose and discuss common misconceptions.
- Use rich collaborative tasks.
- Use higher-order questions.
- Use cooperative small group work.
- Emphasize reasons rather than answers.
- Create connections between topics.
- Use technology in appropriate ways.

Problem Solving Lessons

- **Initial, individual, unscaffolded problem**
  - Students tackle the problem unaided*, in a prior lesson*.
    This work is collected in to inform the teacher.
- **Groups work on the problem**
  - Strategic hints supplied to students that are still struggling.
- **Whole class discussion: the payoff of mathematics**
  - This may be done by discussing a range of sample responses.
- **Individual work**
  - Students improve their solutions to the initial problem,
    or one very much like it.

Boomerangs

Phil and Cath make and sell boomerangs for a school event.
They plan to make them in two sizes: small and large.
Phil will carve them from wood.

The small boomerang takes 2 hours to carve and the large one takes 3 hours. Phil has a total of 24 hours available for carving.

Cath will decorate them. She only has time to decorate 10 boomerangs of either size.

The small boomerang will make $8 for charity.
The large boomerang will make $10 for charity.
They want to make as much money as they can.

How many small and large boomerangs should they make?
How much money will they then make?

Class introduction

Give out the problem sheet and the calculators. Introduce the problem briefly and help the class to understand the problem and its context. You could show examples of boomerangs.

Boomerangs come from Australia, where they are used as weapons or for sport.
When thrown, they travel in a roughly elliptical path and return to the thrower.

Boomerangs are made in many different sizes.
What sizes of boomerang are Phil and Catherine prepared to make?
Why can't they make 50 boomerangs?

Read through the questions carefully and try to answer them as carefully as you can. Show all your working so that I can understand your reasoning.

As well as trying to solve the problem, I want you to see if you can present your work in an organized and clear manner.

Individual work

Allow the class time to tackle Boomerangs.

If students become completely stuck, you may find it helpful to provide them with hints from the sheet provided.

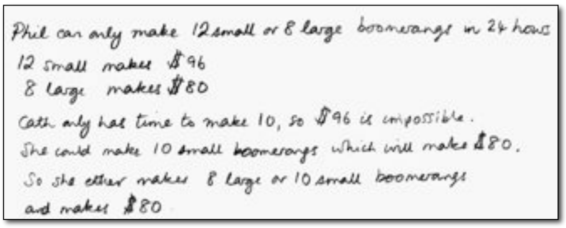
This sheet provides suggestions for strategic questions, which prompt thinking without giving too much away.

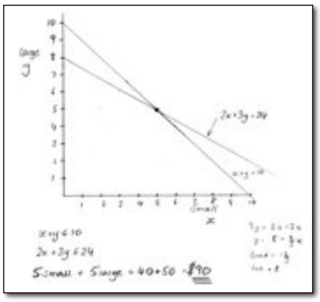
This sheet should be held in reserve, however. Do not give out hints too quickly. Eventually, we want students to solve problems independently of such hints.

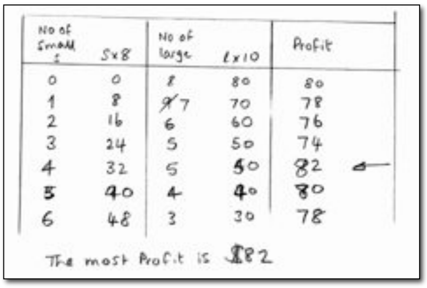
Hints sheet

Read the problem carefully	• What is your aim in this problem? What do you know? • What do you need to find out?
Identify the constraints and variables.	• What is fixed in the problem? What can you vary? • What is the greatest number of small or large boomerangs they can make?
Choose specific numbers for each variable.	• If they were to make 2 small boomerangs, how many large ones could they make? How much money would they make? • Write down the method by which you calculate the profit when you know the number of large and small boomerangs made. Use words or algebra.
Look at other cases in an organized systematic way.	• Try other numbers of large and small boomerangs in a systematic way. • How can you check that you remember the constraints? • Make a table to help organize this.
Check your answer	• Does your answer seem sensible? Does it fit the constraints? • Try other numbers of boomerangs either side of your answer. • Do these give lower profits?

Whole class discussion: comparing different approaches

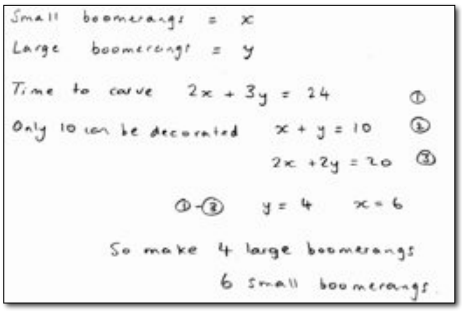

Phil can only make 12 small or 8 large boomerangs in 24 hours
12 small makes $96
8 large makes $80
Cath only has time to make 10, so $96 is impossible.
She could make 10 small boomerangs which will make $80.
So she either makes 8 large or 10 small boomerangs
and makes $80





No of small s	S×8	No of large	ℓ×10	Profit
0	0	8	80	80
1	8	~~8~~ 7	70	78
2	16	6	60	76
3	24	5	50	74
4	32	5	50	82 ←
5	40	4	40	80
6	48	3	30	78

The most profit is $82


Small boomerangs = x
Large boomerangs = y
Time to carve $2x + 3y = 24$ ①
Only 10 can be decorated $x + y = 10$ ②
$2x + 2y = 20$ ③
①-③ $y = 4$ $x = 6$
So make 4 large boomerangs
6 small boomerangs

Students improve their work

Invite students to revise their own work and if they are satisfied, to try a different approach to the problem.

They draw inspiration from the range of approaches shown on the sample work.

Links to the common core standards

Particularly the following practices

1. Make sense of complex problems and persevere.
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique reasoning
4. Model with mathematics

Content

Algebra: Equations and inequations

Modeling: Model situations with equations and inequalities.

Where is the formative assessment?

- Teachers are given information on what students can do unaided;
- Teachers offer diffentiated support to students, as this is needed;
- Students get constructive feedback via other students, and the teacher, as student work is discussed;
- Students act on feedback by improving their responses;
- Teachers get feedback on learning by comparing performance before and after.

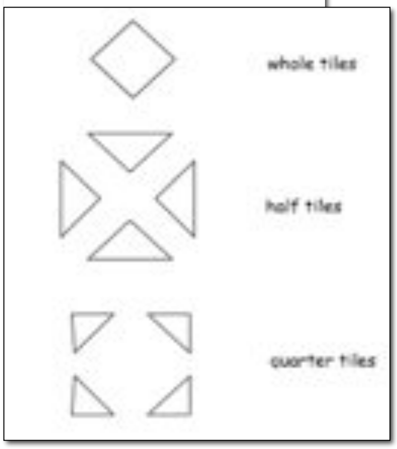


Table tiles

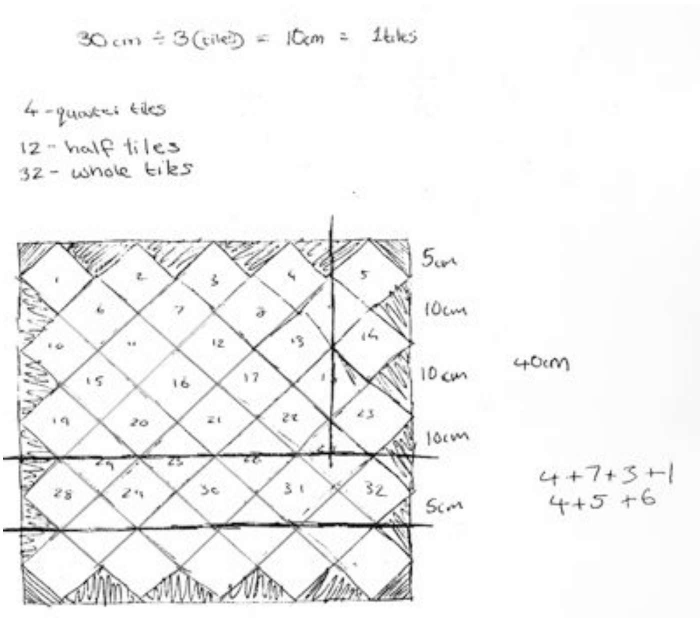
Maria makes square tables, then sticks tiles to the top.

Square tables have sides that are multiples of 10 cm.

Maria only used quarter tiles at the corners and half tiles along edges.

How many tiles of ech type are needed for a 40 cm x 40 cm square?

Describe a method for quickly calculating how many tiles of each type are needed for larger, square table tops.



1) $\frac{1}{2}$ tiles = 10cm $\frac{1}{4}$ tiles = 5cm

on the perimiter;

12x $\frac{1}{2}$ tiles   4x quarter tiles

Inside;

25 whole tiles

2) L = length of side in cm

$$\left(\frac{L - 10\text{cm}}{10}\right) \times 4 = \text{half tiles}$$

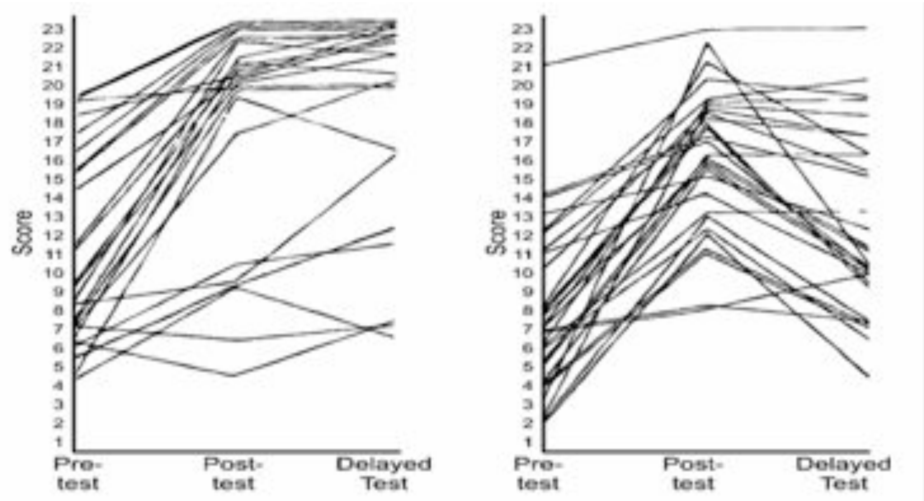
$$4 = \text{quarter tiles}$$

$$\left(\frac{L}{10}\right)^2 + \left(\frac{L}{10} - 1\right)^2 = \text{whole tiles}$$

Design Principles for Concept Lessons

- **Expose and explore students' existing ideas**
  - "pull back the rug"
- **Confront with implications, contradictions, obstacles**
  - provoke 'tension' and 'cognitive conflict'
- **Resolve conflict through discussion**
  - allow time for formulation of new concepts.
- **Generalize, extend and link learning**
  - applying to new contexts.

Diagnostic teaching v Reinforcement



Concept Development Cycle

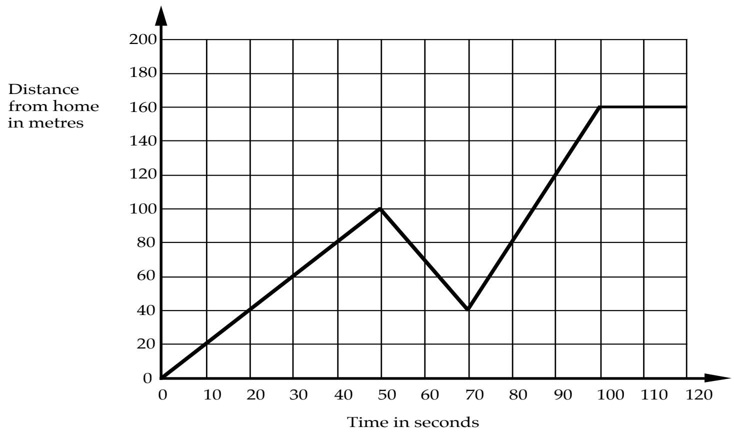
- **Initial, individual task**
  - An assessment task is presented and a range of responses are evoked. The task is put to one side.
- **Collaborative discussion**
  - Prior conceptions are discussed and debated. Teacher aims to provoke cognitive conflict through questioning.
- **Whole class discussion**
  - Pre-conceptions are explicitly challenged.
- **Revisit initial task**
  - The assessment task is re-examined and responses are improved. Students describe what they have learned.

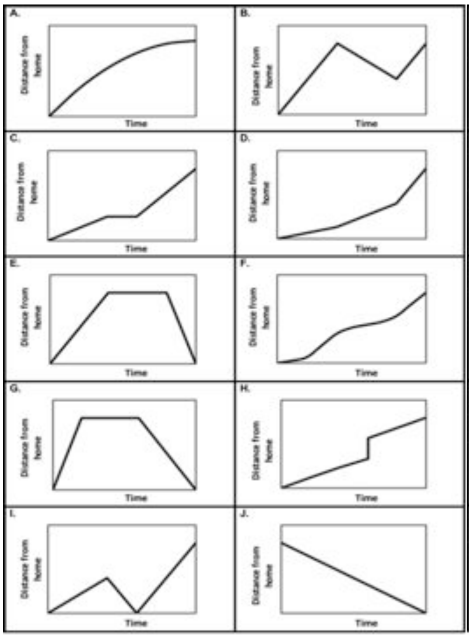
Task "genres" for concept development

- **Translation: linking multiple representations**
  – what is another way of showing this?
- **Testing assertions & "misconceptions"**
  – always, sometimes or never true?
- **Classifying objects & challenging definitions**
  – what is the same and what is different?
- **Modifying problems & exploring structure**
  – what happens if I change this?
  – How will it affect this?

Interpreting Graphs

Every morning Jane walks along a straight road to a bus stop 160 metres from her home, where she catches a bus to college.
The graph shows her journey on one particular day. Describe what may have happened.





A. Tom ran from his home to the bus stop and waited. He realised that he had missed the bus so he walked home.	B. Opposite Tom's home is a hill. Tom climbed slowly up the hill, walked across the top and then ran quickly down the other side.
C. Tom skateboarded from his house, gradually building up speed. He slowed down to avoid some rough ground, but then speeded up again.	D. Tom walked slowly along the road, stopped to look at his watch, realised he was late, then started running.
E. Tom left his home for a run, but he was unfit and gradually came to a stop!	F. Tom walked to the store at the end of his street, bought a newspaper, then ran all the way back.
G. Tom went out for a walk with some friends when he suddenly realised he had left his wallet behind. He ran home to get it and then had to run to catch up with the others.	H. This graph is just plain wrong. How can Tom be in two places at once?
I. After the party, Tom walked slowly all the way home.	J. Make up your own story!

Percent changes

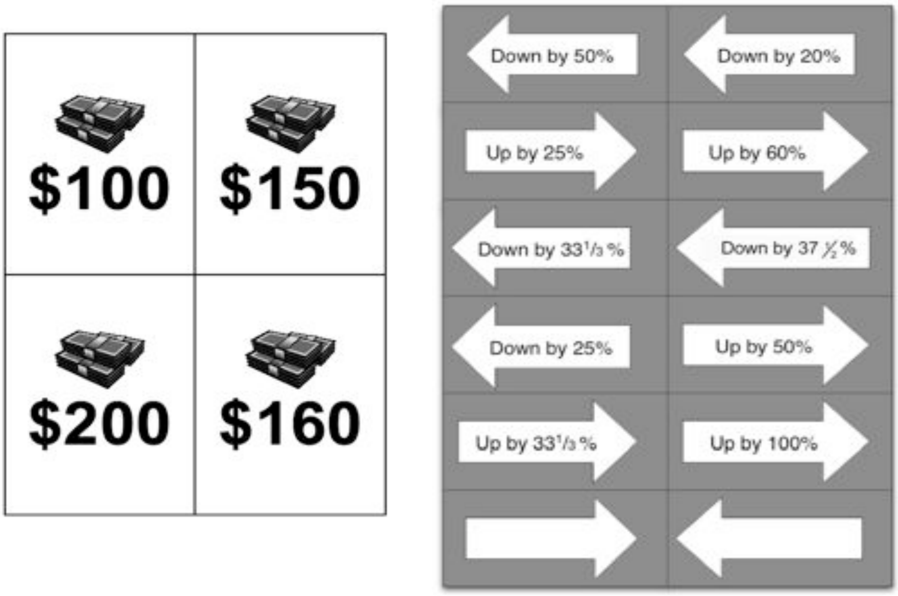
The sheet of questions *Percent changes* is given to students for homework before the lesson, or in the previous lesson.

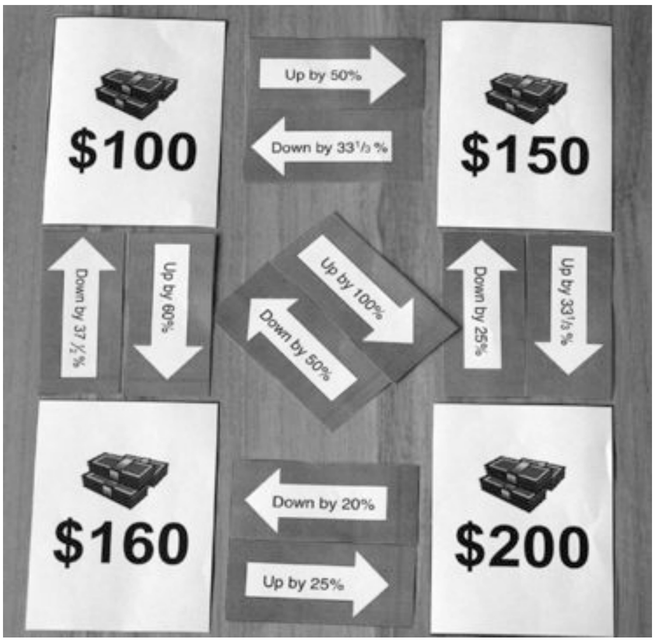
This sheet may be used to discover the kinds of difficulties that students have with percent changes.

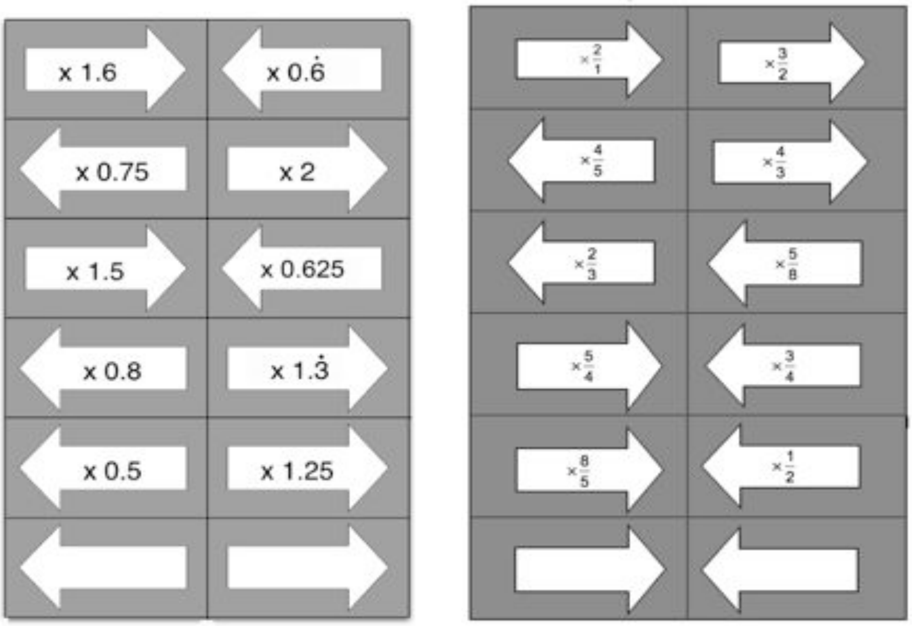
1. Tom usually earns $40.85 per hour.
   He has just heard that he has had a 6% pay rise.
   He wants to work out his new pay on this calculator.
   It does not have a percent button.

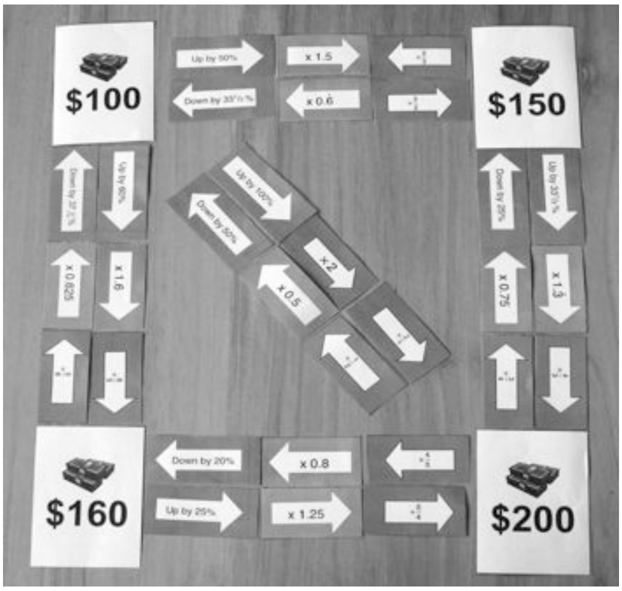
   Which keys must he press on his calculator?
   Write down the keys in the correct order.
   (You do not have to do the calculation.)

- Typically, students will try to add rather than multiply for this question, producing:
  40.85 + 0.6;
  40.85 + 1.6;
  40.85 + 1.06 ....
- Others calculate 1% and then multiply by 6 to find 6%, then add this answer on:
  (40.85÷100) x 6 + 40.85.
  While correct, this is inefficient.
- **A single multiplication by 1.06 is enough.**


$100
$150
$200
$160
Down by 50%
Down by 20%
Up by 25%
Up by 60%
Down by 33¹/₃ %
Down by 37 ½ %
Down by 25%
Up by 50%
Up by 33¹/₃ %
Up by 100%


$100
Up by 50%
Down by 33¹/₃ %
$150
Down by 37 ½ %
Up by 60%
Up by 100%
Down by 50%
Down by 25%
Up by 33¹/₃ %
$160
Down by 20%
Up by 25%
$200


x 1.6
x 0.6̇
x 0.75
x 2
x 1.5
x 0.625
x 0.8
x 1.3̇
x 0.5
x 1.25
$\times\frac{2}{1}$
$\times\frac{3}{2}$
$\times\frac{4}{5}$
$\times\frac{4}{3}$
$\times\frac{2}{3}$
$\times\frac{5}{8}$
$\times\frac{5}{4}$
$\times\frac{3}{4}$
$\times\frac{8}{5}$
$\times\frac{1}{2}$


$100
$150
$160
$200
x 1.5
x 0.6̇
x 0.8
x 1.25
x 0.75
x 1.6
x 0.625
x 2
x 0.5

Links to the common core standards

Particularly the following practices

7 Look for and make use of structure.

8 Look for and express regularity in repeated reasoning.

Content (Grade 7!!)

Number

6. Understand that percentages are rates per 100.
7. Find a percentage of a quantity; solve problems involving finding the whole given a part and the percentage.
8. Solve multistep percent problems. Examples: percent increase and decrease...

Why formative assessment? The essence:

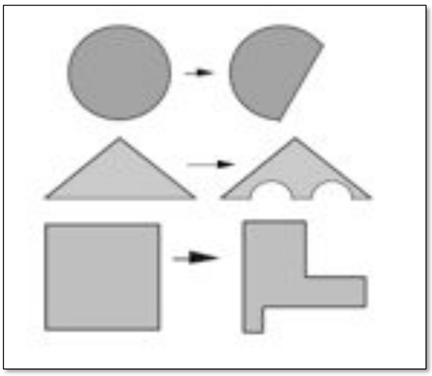
"I thought that if I taught them all the pieces,
they could put them together.
Now I see that they can't."

A teacher's comment to the observer in MAP trials

The essential extra components are the *mathematical practices*.

Always, sometimes or never true?

When you cut a piece off a shape you reduce its area and perimeter



Always,Sometimes or Never True?

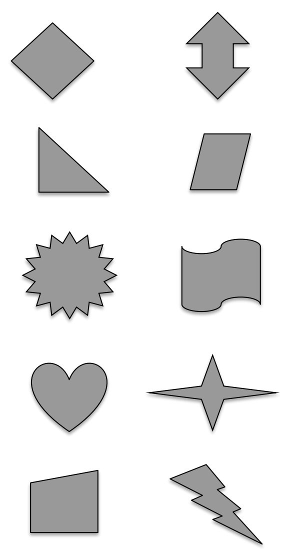
1 $x-6=6-x$	2 $x+6=y+6$
3 $\frac{x}{6}=\frac{6}{x}$	4 $6+2x=8x$
5 $2(x-3)=2x-3$	6 $2(x+3)=2x+6$
7 $\frac{x+6}{2}=x+3$	8 $x^2=2x$
9 $(x+3)^2=x^2+3^2$	10 $(x-6)^2=(6-x)^2$
11 $(3x)^2=9x^2$	12 $x^2-1=(x+1)(x-1)$
13 $x^2+6=0$	14 $(x+1)(x+4)=x^2+14$

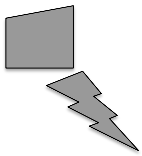
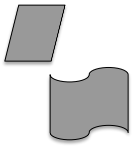
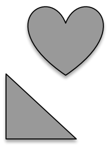
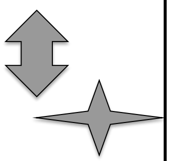
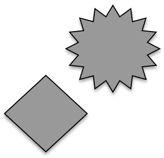
Classifying mathematical objects

Students learn to:

- Discriminate carefully
- Recognise properties of objects
- Classify mathematical objects according to different attributes
- Create and use categories to build definitions
- Develop mathematical language

	No rotational symmetry	Rotational symmetry
No lines of symmetry		
One or two lines of symmetry		
More than two lines of symmetry		



	No rotational symmetry	Rotational symmetry
No lines of symmetry		
One or two lines of symmetry		
More than two lines of symmetry		

Is it possible to find a shape that has no rotational symmetry which has more than two lines of symmetry?

Modifying problems, exploring structure

Students:

- Explore the effect of variation.
- Explore how one variable depends upon another.
- Creative their own problems.
- Take on the role of teacher and explainer.
- Exemplify the ‘doing’ and ‘undoing’ processes of mathematics.

Making and selling candles

The cost of buying the kit (includes molds, wax, wicks)	$ 50 (k)	
The number of candles that can be made with the kit	60 (n)	candles
The price at which he sells each candle	$ 4 (s)	
Total profit made if all candles are sold.	$ (p)	

$$p = 60 \times 4 - 50$$

Making and selling candles

The cost of buying the kit (includes molds, wax, wicks)	$ 50 (k)	
The number of candles that can be made with the kit	60 (n)	candles
The price at which he sells each candle	$ 4 (s)	
Total profit made if all candles are sold.	$ (p)	

$$p = ns - k$$

Making and selling candles

The cost of buying the kit (includes molds, wax, wicks)	$	*k*: 50	
The number of candles that can be made with the kit		*n*: 60	candles
The price at which he sells each candle	$	*s*:	
Total profit made if all candles are sold.	$	*p*: 190	

$$s = \frac{190 + 50}{60}$$

Making and selling candles

The cost of buying the kit (includes molds, wax, wicks)	$	*k*: 50	
The number of candles that can be made with the kit		*n*: 60	candles
The price at which he sells each candle	$	*s*:	
Total profit made if all candles are sold.	$	*p*: 190	

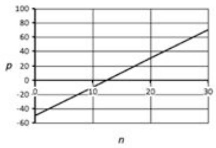
$$s = \frac{p + k}{n}$$

Making and selling candles

The cost of buying the kit (includes molds, wax, wicks)	$	k: 50	
The number of candles that can be made with the kit		n:	candles
The price at which he sells each candle	$	s: 4	
Total profit made if all candles are sold.	$	p:	

$$p = 4n - 50$$

n	0	10	20	30	40	50
p	-50	-10	30	70	110	150



Making and selling candles

The cost of buying the kit (includes molds, wax, wicks)	$	k: 50	
The number of candles that can be made with the kit		n:	candles
The price at which he sells each candle	$	s: 4	
Total profit made if all candles are sold.	$	p:	

$$p = ns - k \qquad s = \frac{p+k}{n} \qquad n = \frac{p+k}{s} \qquad k = ns - p$$

Thank you

http://map.mathshell.org.uk/materials/

Contacts:

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Malcolm.Swan@nottingham.ac.uk

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A Next Generation Assessment Model Designed to Measure the CCSS

Presented by Dan Hupp
Maine Department of Education

To the National Council of Supervisors of Mathematics

Indianapolis, IN (4/13/11)

The Challenge

How do we get from here…

Common Core State Standards specify K-12 expectations for college and career readiness

…to here?

All students leave high school college and career ready

…and what can an assessment system do to help?

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2

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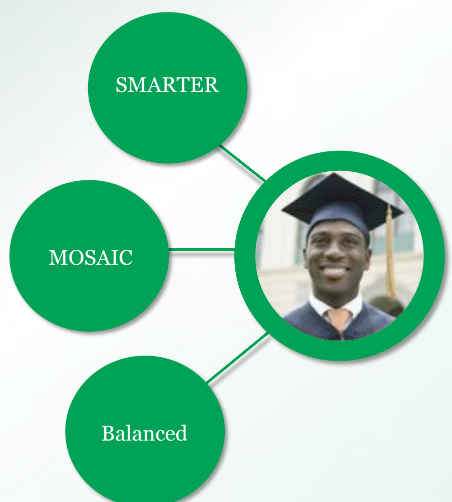
Background

Historical Development of the SMARTER Balanced Assessment Consortium

- Computer Adaptive
- Formative Capacity
- Integrated System



4

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The Purpose of the Consortium

- To develop a set of comprehensive and innovative assessments for grades 3-8 and high school in English language arts and mathematics aligned to the Common Core State Standards
- Students leave high school prepared for postsecondary success in college or a career through increased student learning and improved teaching
- The assessments shall be operational across Consortium states in the 2014-15 school year

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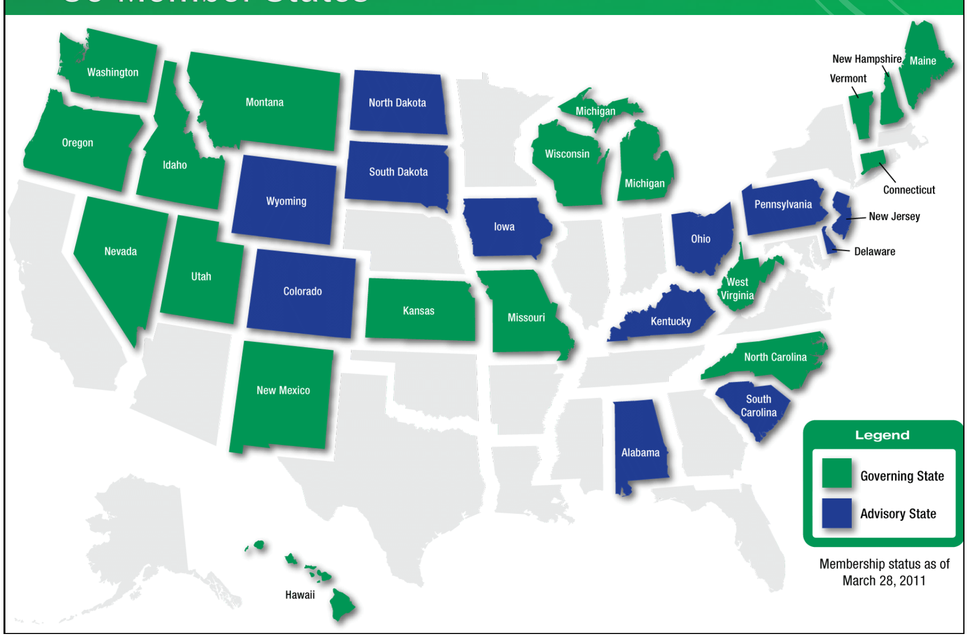
5

30 Member States



A 30-State Consortium

18 Governing States	12 Advisory States
CT, HI, ID, KS, ME, MI, MO, MT, NC, NH, NM, NV, OR, UT, VT, WA, WI, WV	AL, CO, DE, IA, KY, ND, NJ, OH, PA, SC, SD, WY
Total Number of States = 30	

Fiscal Agent: Washington State

Membership Status as of March 30, 2011

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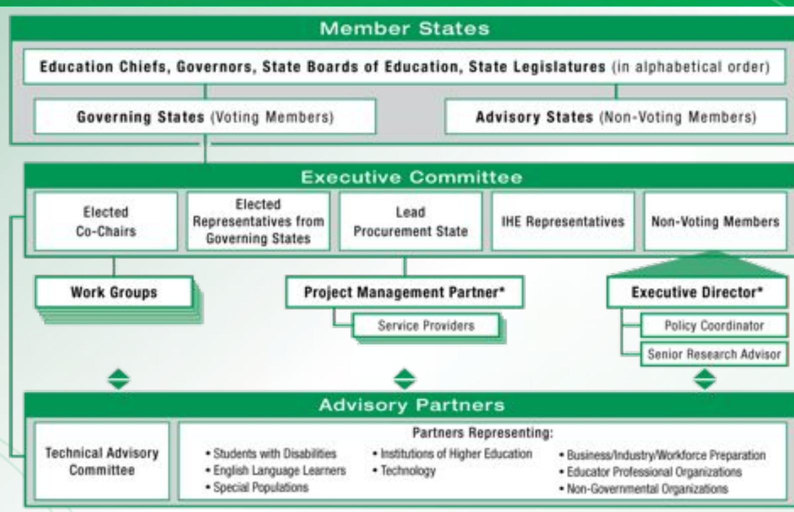
7

Organization Chart



*Under contract with Lead Procurement State

Refer to www.k12.wa.us/SMARTER for the detailed governance structure.

Approved: March 15, 2011

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8

Consortium Governance

Co-Chairs	Tony Alpert (OR) Judy Park (UT)
Executive Director	Joe Willhoft
Executive Committee	Dan Hupp (ME); Joseph Martineau (MI); Carissa Miller (ID); Lynette Russell (WI); Mike Middleton (WA); Higher Education Representative
Project Management Partner	WestEd
Policy Coordinator	Sue Gendron
Senior Research Advisor	Linda Darling-Hammond

Last Modified November 8,2010

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9

Consortium Work Groups

Consortium has established 10 work groups

Work group engagement of 80 state-level staff:

- Each work group: 2 co-chairs and 6 members from states; 1 liaison from the Executive Committee; 1 WestEd partner

Work group responsibilities:

- Define scope and time line for work in its area
- Develop a work plan and resource requirements
- Determine and monitor the allocated budget
- Oversee Consortium work in its area, including identification and direction of vendors

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10

Work Groups

1. Transition to Common Core State Standards
2. Technology Approach
3. Assessment Design: Item Development
4. Assessment Design: Performance Tasks
5. Assessment Design: Test Design
6. Assessment Design: Test Administration
7. Reporting
8. Formative Processes and Tools/Professional Development
9. Accessibility and Accommodations
10. Research and Evaluation

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11

Technical Advisory Committee

Jamal Abedi	University of California, Davis
Randy Bennett	Educational Testing Service
Derek Briggs	University of Colorado at Boulder
Greg Cizek	University of North Carolina
David Conley	University of Oregon
Linda Darling-Hammond	Stanford University
Brian Gong	National Center for the Improvement of Educational Assessment
Ed Haertel	Stanford University
Joan Herman	University of California, Los Angeles and CRESST
Jim Pellegrino	University of Illinois at Chicago
W. James Popham	University of California, Los Angeles
Joseph M. Ryan	Arizona State University
Martha Thurlow	University of Minnesota and NCEO

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12

Institution of Higher Education (IHE) Partners

- IHE partners
  - Include 169 public and 13 private institutions and systems of Higher Education
  - represent nearly 73% of the total number of direct matriculation students across all SMARTER Balanced States
- IHE representatives and/or postsecondary faculty may serve on:
  - Executive Committee
  - Assessment scoring and item review committees
  - Standard-setting committees

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13

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Assessment System Overview

Theory of Action

- A model of verifiable accomplishments/milestones, leading to the desired outcome
- Accomplishments/milestones are interdependent
- The theory of action is closely linked to the validation argument for the assessment system

15

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Seven Principles Underlying the Theory of Action

- An integrated system
- Evidence of student performance
- Teacher involvement
- State-led with transparent governance
- Continuously improve teaching and learning
- Useful information on multiple measures
- Adheres to established professional standards

16

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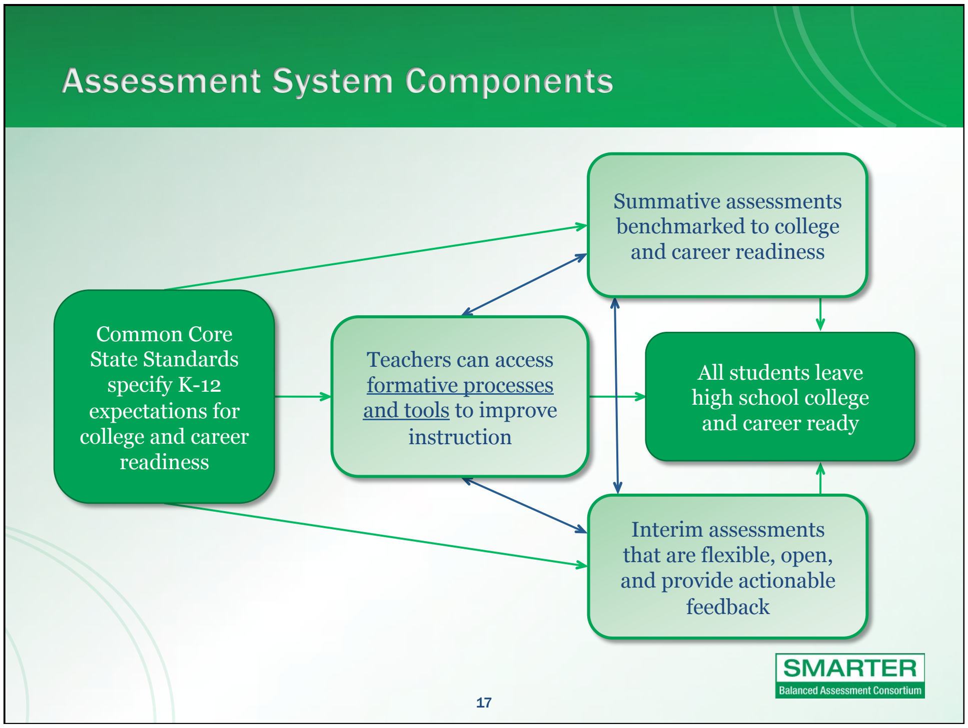
Assessment System Components
Common Core State Standards specify K-12 expectations for college and career readiness
Teachers can access formative processes and tools to improve instruction
Summative assessments benchmarked to college and career readiness
All students leave high school college and career ready
Interim assessments that are flexible, open, and provide actionable feedback
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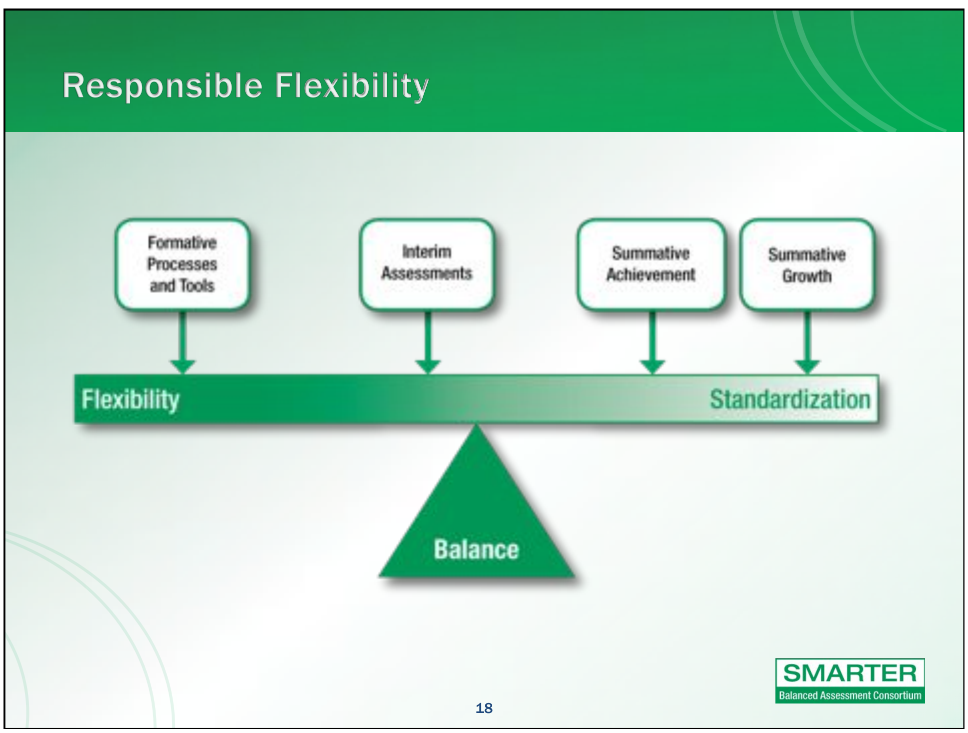
17


Responsible Flexibility
Formative Processes and Tools
Interim Assessments
Summative Achievement
Summative Growth
Flexibility
Standardization
Balance
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18

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Assessment System

Federal Assessment Requirements

- Assess acquisition of and progress toward "college and career readiness"
- Have common, comparable scores across member states
- Provide achievement and growth information for teacher and principal evaluation and professional development
- Assess all students, except those with "significant cognitive disabilities"
- Administer online, with timely results
- Use multiple measures

Source: Federal Register / Vol. 75, No. 68 / Friday, April 9, 2010 pp. 18171-85

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20

Assessment System Components

Assessment system that balances summative, interim, and formative components for ELA and mathematics:

- **Summative Assessment (Computer Adaptive)**
  - Mandatory comprehensive assessment in grades 3–8 and 11 (testing window within the last 12 weeks of the instructional year) that supports accountability and measures growth
  - Selected response, short constructed response, extended constructed response, technology enhanced, and performance tasks
- **Interim Assessment (Computer Adaptive)**
  - Optional comprehensive and content-cluster assessment
  - Learning progressions
  - Available for administration throughout the year
  - Selected response, short constructed response, extended constructed response, technology enhanced, and performance tasks
- **Formative Processes and Tools**
  - Optional resources for improving instructional learning
  - Assessment literacy

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21

Summative Assessments

- Mandatory comprehensive accountability measures that include **computer adaptive assessments** and performance tasks
- Computer adaptive testing offers **efficient and precise measurement** and quick results
- **Assesses the full range of CCSS** in English language arts and mathematics

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22

Summative Assessments

- Describes **current achievement and growth** across time, showing progress toward college and career readiness
- Provides **state-to-state comparability**, with standards set against **research-based benchmarks**
- Summative tests can be given **twice a year**

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Interim Assessments

- Optional **comprehensive and content-cluster measures** that include **computer adaptive assessment** and **performance tasks**
- Provides **clear examples of expected performance** on common standards
- Helps **identify specific needs** of each student

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24

Interim Assessments

- Grounded in cognitive development theory about how **learning progresses**
- Aligned to and reported on the **same scale as the summative assessments**
- Involves significant **teacher participation** in design and scoring
- **Fully accessible** for instruction and professional development

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25

Formative Processes and Tools

- **Instructionally sensitive, on-demand tools and strategies** aimed at improving teaching, increasing student learning, and enabling differentiation of instruction
- Processes and tools are **research based**
- **Clearinghouse of professional development materials** available to educators includes model units of instruction, publicly released assessment items, formative strategies, and materials for professional development

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26

Formative Processes and Tools

- **System Portal** contains information about Common Core State Standards, Consortium activities, web-based learning communities, and assessment results
- **Dashboard** gives parents, students, practitioners, and policymakers access to assessment information
- Reporting capabilities include **static and dynamic reports**, secure and public views
- Item development and scoring application support **educator participation in assessment**
- **Feedback and evaluation mechanism** provides surveys, open feedback, and vetting of materials

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27

Key Features: Computer Adaptive Testing

- Comprehensively assesses the **breadth of the Common Core State Standards** while **minimizing test length**
- Allows **increased measurement precision** relative to fixed form assessments; important for providing accurate growth estimates
- **Testing experience is tailored** to student ability as measured during the test

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28

Key Features: Tailored, Online Reporting

- Supports **access to information about student progress** toward college and career readiness
- Allows for exchange of **student performance history** across districts and states
- Uses a Consortium-supported backbone, while individual **states retain jurisdiction** over access and appearance of online reports
- Tied to **digital clearinghouse of formative materials**
- **Graphical display of learning progression** status (interim assessment)

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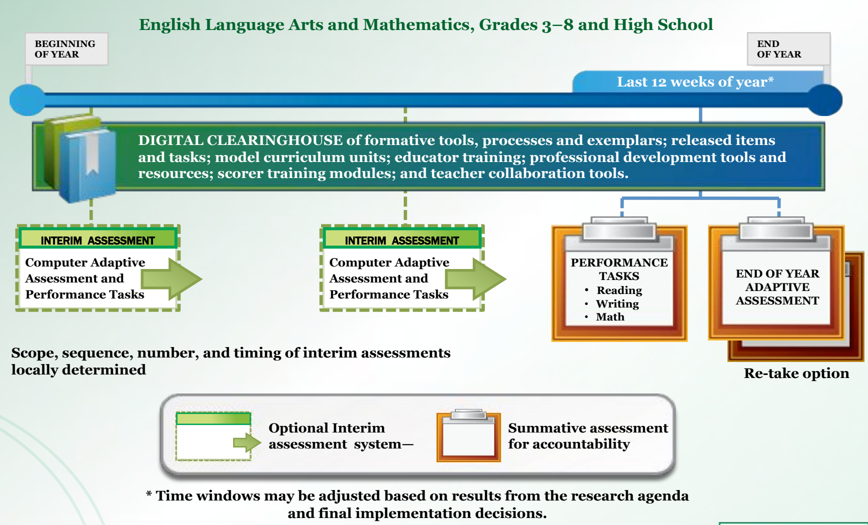
29

The System



Source: http://www.ets.org

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30

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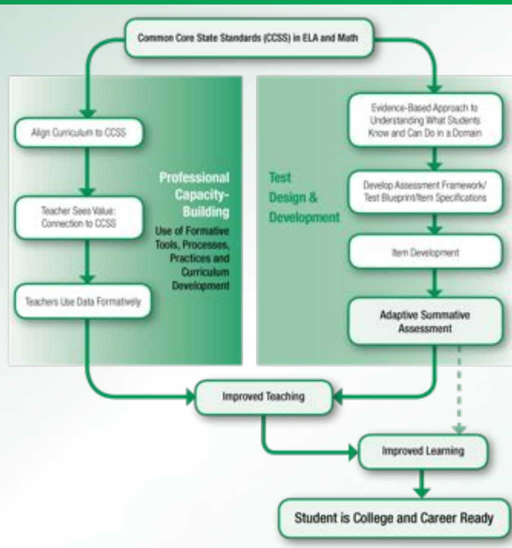
Summary

SMARTER Balanced Assessment System



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32

Achieving College Readiness

- Allows students to **enter college having met clear, common standards**
- **Interim assessments** provide students, teachers, and parents with detailed, actionable information about knowledge and skills needed for college entry and success
- Students enrolled in IHEs and IHE systems will be able to be **exempt from remedial courses** if they have met the Consortium-adopted achievement standard for each assessment

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33

Timeline

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34

Benefits of a Multi-State Consortium

- **Less cost and more capabilities** through scope of work sharing and collaboration
- **More control** through shared interoperable open-source software platforms: Item authoring system, item banking, and adaptive testing platform no longer exclusive property of vendors
- **Better service** for students with disabilities and EL students through common, agreed-upon protocols for accommodations

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35

To find out more…

…the **SMARTER Balanced Assessment Consortium** can be found online at

www.k12.wa.us/SMARTER

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36

Appendix

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Grant Availability

- April 7, 2010: USED released the Notice Inviting Applications (NIA) for the Race to the Top Assessment Program
- Applications were due June 23 (11 weeks)
- Up to two awards not exceeding $150M each for summative ELA/math assessments in grades 3-8 and high school, with possible supplement in $10M pieces
- Grants for development only; preparing assessments that can be given in 2014-15

38

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Consortium and State Requirements

- "Applicant" is a single state representing a consortium of at least 15 states with at least 5 Governing States
- Two types of membership: Governing State or Advisory
- Member states submit an MOU signed by Governor, Chief School Officer, President of State Board of Education, Chief Procurement Officer
- Membership condition: States must adopt the Common Core State Standards by Dec. 31, 2011, or drop
- Acquire services of a Project Management Partner

39

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