

Mathematics in Education and Industry

50 years at the forefront of Mathematics Education

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Assessment for Learning at GCSE

Simon Clay and Debbie Barker

This session will look at the research supporting Assessment for learning in mathematics and go on to consider practical strategies for embedding formative assessment in the teaching of GCSE mathematics.

MEI Innovators in Mathematics Education Mathematics in Education and Industry

By the end of this session you should

- be able to describe an overview of the research on AfL
- have had the time and opportunity to try a selection of simple and effective AfL activities
- know where to find further reading and resources

MEI Innovators in Mathematics Education Mathematics in Education and Industry

When we say AfL what do you think it is?

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Assessment for learning & Formative assessment

'Assessment for learning is any assessment for which the first priority in its design is to serve the purpose of promoting pupil's learning.'
(Hodgen & Wiliam, 2006)

MEI Innovators in Mathematics Education Mathematics in Education and Industry

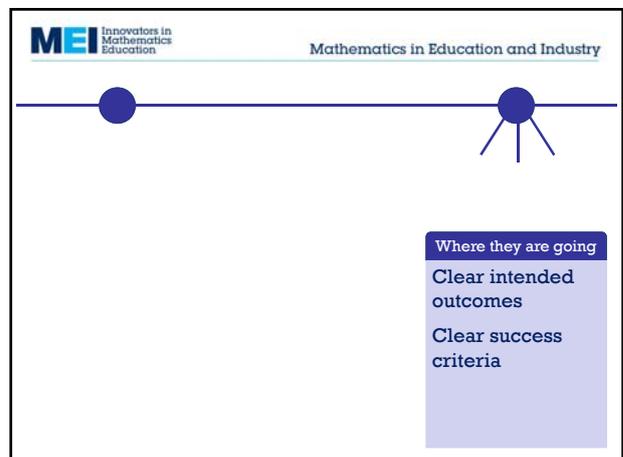
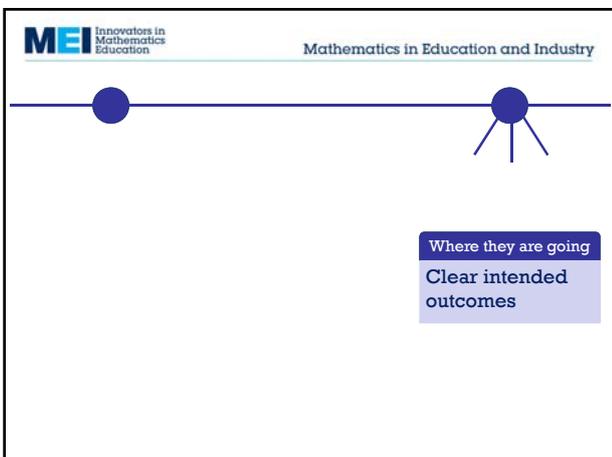
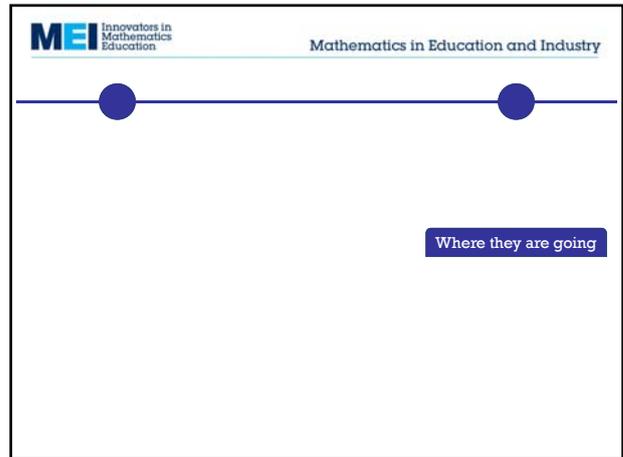
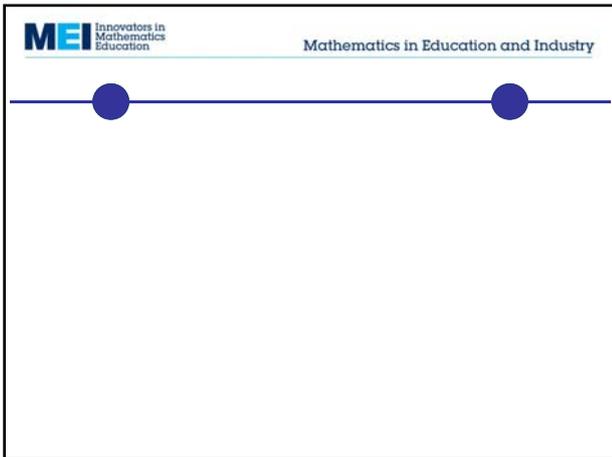
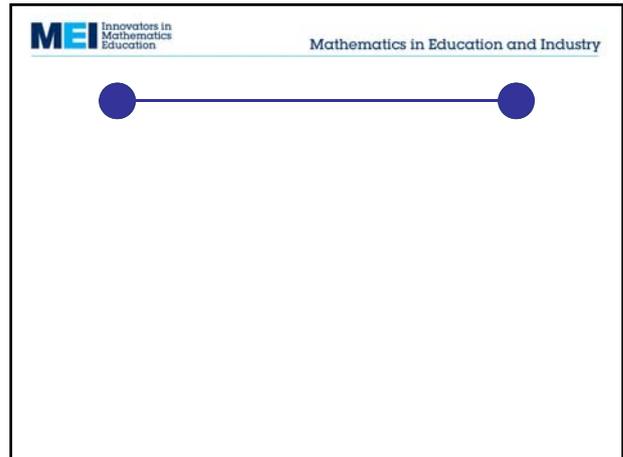
Assessment for learning & Formative assessment

'An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have made in the absence of that evidence.'
(D. Wiliam, 2011)

MEI Innovators in Mathematics Education
Mathematics in Education and Industry

The 5 key formative assessment strategies

	The three 'processes'		
	Where the student is going	Where the student is right now	How to get there
Teacher	1 Clarifying learning intentions and sharing criteria for success	2 Engineering effective classroom discussions, activities and tasks that elicit evidence of learning	3 Providing feedback that moves students forward
Peer	Understanding and sharing learning intentions and criteria for success	4 Activating students as instructional resources for one another	
Student	Understanding learning intentions and criteria for success	5 Activating students as the owners of their own learning	



MEI Innovators in Mathematics Education Mathematics in Education and Industry

Where they are now

Where they are going

- Clear intended outcomes
- Clear success criteria

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Where they are now

- Assess starting point(s)
- Gather evidence

Where they are going

- Clear intended outcomes
- Clear success criteria

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Where they are now

- Assess starting point(s)
- Gather evidence
- Use experience and knowledge

Where they are going

- Clear intended outcomes
- Clear success criteria

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Where they are now

- Assess starting point(s)
- Gather evidence
- Use experience and knowledge

How to get there

Where they are going

- Clear intended outcomes
- Clear success criteria

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Where they are now

- Assess starting point(s)
- Gather evidence
- Use experience and knowledge

How to get there

- Plan activities which move students on
- Assessing progress
- Provide feedback which moves students on

Where they are going

- Clear intended outcomes
- Clear success criteria

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Describe to the person next to you what you hope the rest of the session will help you to achieve

MEI Innovators in Mathematics Education
Mathematics in Education and Industry

Feedback

'Three types of feedback are essential... student to teacher... teacher to studentbetween students'
(Hodgen & Wiliam, 2006)

'Feedback should always cause thinking'
(Wiliam, 2011)

MEI Innovators in Mathematics Education
Mathematics in Education and Industry

Questioning

'...using mathematical questions as prompts and devices for promoting students in thinking mathematically, and thus becoming better at learning and doing mathematics.'
(Watson & Mason, 1998)

MEI Innovators in Mathematics Education
Mathematics in Education and Industry

Questioning for useful and immediate feedback

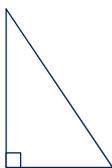
MEI Innovators in Mathematics Education
Mathematics in Education and Industry

Questioning for useful and immediate feedback

$$\frac{a}{b} \text{ of } c = 18$$

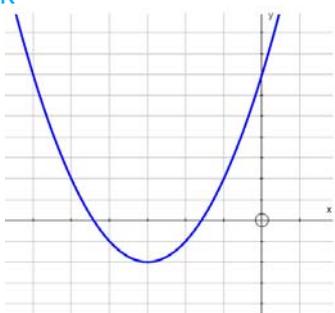
MEI Innovators in Mathematics Education
Mathematics in Education and Industry

Questioning for useful and immediate feedback



MEI Innovators in Mathematics Education
Mathematics in Education and Industry

Questioning for useful and immediate feedback



MEI Innovators in Mathematics Education Mathematics in Education and Industry

Recording assessment grades

Algebra, Sequences & Graphs

	Jack	Thom	Soph	Sam	Chris	Ellial	Chris	Rosie	Emily	Chris	Soph	Nath	Terri	Luke	Stam	Jamie	Kenzi	Hann	Laur	Philp	Ben	Sho	Joan	Mark	Lucy	Jack
Find the nth term of a sequence which has a two-part rule	G																									
Plot graphs of real life functions	G																									
Solve simultaneous equations by graphical methods	G																									
Understand the relationship between a line's equation and its intercept and gradient	G																									
Find points on a line given its equation	G																									
Find the equation of a line given points that lie upon it	G																									
Find the equation of lines that are parallel	G																									
Plot graphs of quadratic functions	G																									
Find the nth term of a descending sequence	A																									
Interpret curved sections of distance-time																										

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Recording assessment grades

Algebra, Sequences & Graphs

	Jack	Thom	Soph	Sam	Chris	Ellial	Chris	Rosie	Emily	Chris	Soph	Nath	Terri	Luke	Stam	Jamie	Kenzi	Hann	Laur	Philp	Ben	Sho	Joan	Mark	Lucy	Jack
Continue sequences of diagrams	G																									
Find missing values and/or word rule in a sequence with a single operation rule	G																									
Find the nth term of a sequence which has a single operation rule	F																									
Find the nth term of a sequence which has a two-part rule	C																									
Find the nth term of a descending sequence	B																									
Find the nth term of a quadratic sequence	A																									

MEI Innovators in Mathematics Education Mathematics in Education and Industry

In class feedback

MEI Innovators in Mathematics Education Mathematics in Education and Industry

In class feedback

Design a question on our recent study of $C = \pi d$ which best represents your understanding

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Further reading

Dylan Wiliam
 Embedded formative assessment
 ISBN-10: 193400930X

Malcolm Swan
<http://map.mathshell.org.uk/materials/index.php>

MEI Innovators in Mathematics Education Mathematics in Education and Industry

Please tell us one way your understanding of AfL has altered.

OR

Please tell us one way of improving this session.

Write down one thing you are going to do before the summer holidays as a result of this session.