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## Assessment for Learning at A Level

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 A Level mathematics.



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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



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When we say AfL what do you think it is?




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### 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)



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### Assessment for learning & Formative assessment

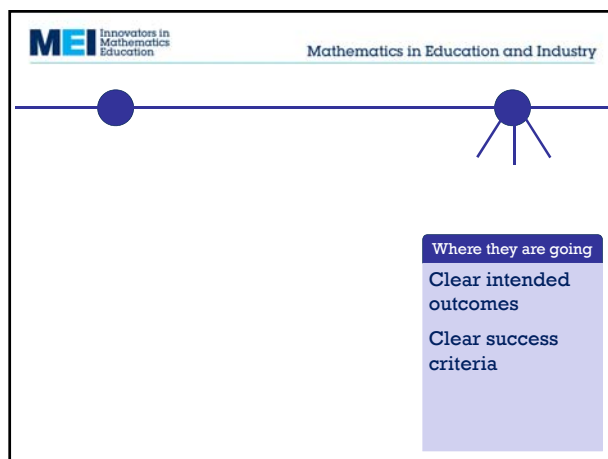
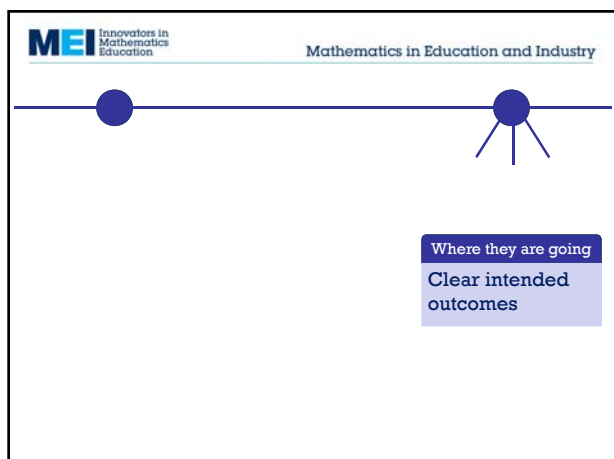
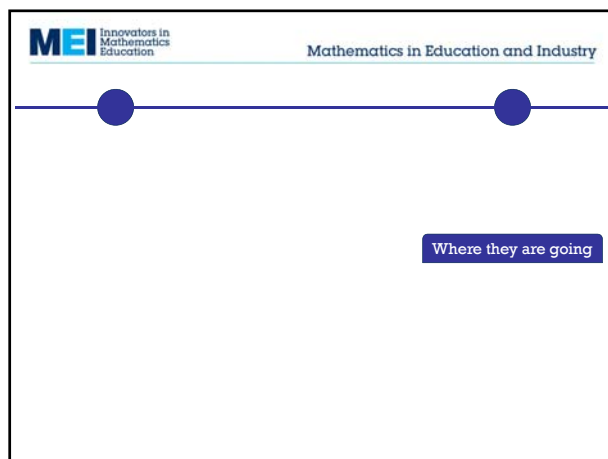
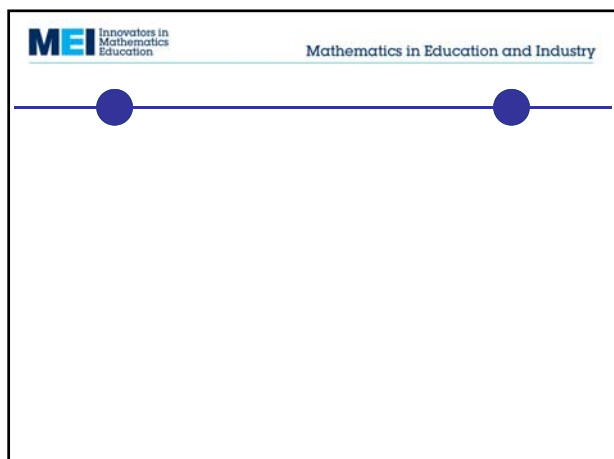
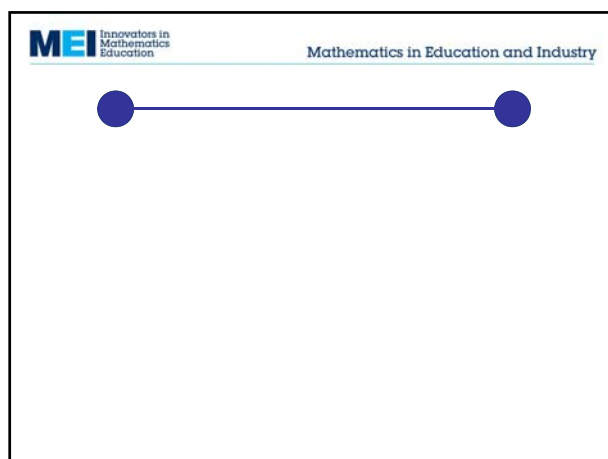
'An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have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

(D. Wiliam, 2011)

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### The 5 key formative assessment strategies

	The three 'processes'		
	Where the student is going	Where the student is right now	How to get there
<b>Teacher</b>	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
<b>Peer</b>	Understanding and sharing learning intentions and criteria for success	4 Activating students as instructional resources for one another	
<b>Student</b>	Understanding learning intentions and criteria for success	5 Activating students as the owners of their own learning	



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**Where they are now**

**Where they are going**

- Clear intended outcomes
- Clear success criteria

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**Where they are now**

- Assess starting point(s)
- Gather evidence

**Where they are going**

- Clear intended outcomes
- Clear success criteria

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**Where they are now**

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

**Where they are going**

- Clear intended outcomes
- Clear success criteria

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**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

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**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

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

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## Feedback

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

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

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## 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)

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## Question design

Degrees	Radians
30°	
	$\frac{\pi}{5}$
	$\frac{4}{7}$
45°	
	$\frac{1}{2}$
37°	
	0.61

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## Question design

30°,  $\frac{\pi}{5}$ , 0.61, 45°,  $\frac{1}{2}$ ,  $\frac{4}{7}$

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## Questioning for useful and immediate feedback

$$\frac{dy}{dx} = -\frac{3}{2\sqrt{x}}$$

$$\frac{dy}{dx} = 3x$$

or

$$\frac{dy}{dx} = 4x^3$$

or

$$\frac{dy}{dx} = e^x \cos x$$

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## Feedback between students

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### Rich Starting Questions

Let P be the point (2, 4) on the curve  $y = x^2$ .  
Let the point A be where the tangent to the curve at P crosses the x-axis and B be the point where the tangent crosses the y-axis.  
Find the area AOB.

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### Recording assessment grades

Quadratic equations of the form  $y = ax^2 + bx + c$

Surname	Forename	Factorisation		Completing the square			Solve		Discriminant		Sketch	Percentage	Grade
		a = 1	a ≠ 1	DOTS	a = 1	a ≠ 1	Vertex	Evaluate	Interpret				
	Ahmed	2	0	0	1	1	1	1	1	1	0	40	E
	Bertram	1	0	0	1	0	0	1	2	1	1	35	U
	Clarissa	2	1	2	2	2	2	2	2	1	1	85	A
	Desmonda	1	0	1	1	1	0	1	2	0	1	40	E
	Erik	1	0	1	2	2	0	0	2	1	2	55	D
	Frances	2	1	1	1	2	1	2	2	1	1	70	B
Average		75%	17%	42%	67%	67%	33%	58%	92%	42%	50%		

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### Classroom talk

'Talking is central to ... teaching mathematics formatively'  
(Hodgen & Wiliam, 2006)

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### Further reading

**Dylan Wiliam**  
Embedded formative assessment  
ISBN-10: 193400930X

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

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

**OR**

Please tell us one way of improving this session.

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