



**Advanced Mathematics  
Support Programme®**

# About the AMSP

- A government-funded initiative, managed by MEI, providing national support for teachers and students in all state-funded schools and colleges in England.
- It aims to increase participation in AS/A level Mathematics and Further Mathematics, and Core Maths, and improve the teaching of these qualifications.
- Additional support is given to those in priority areas to boost social mobility so that, whatever their gender, background or location, students can choose their best maths pathway post-16, and have access to high quality maths teaching.

# MEI holds the NCETM CPD Standard

The CPD Standard supports maths teachers to access information about the wide range of CPD provision on offer and to be assured of its appropriateness and quality.

*[ncetm.org.uk/cpdstandard](http://ncetm.org.uk/cpdstandard)*

Continuing Professional  
Development  
Standard

National Centre  
for Excellence in the  
Teaching of Mathematics





# Resources for different types of Knowing

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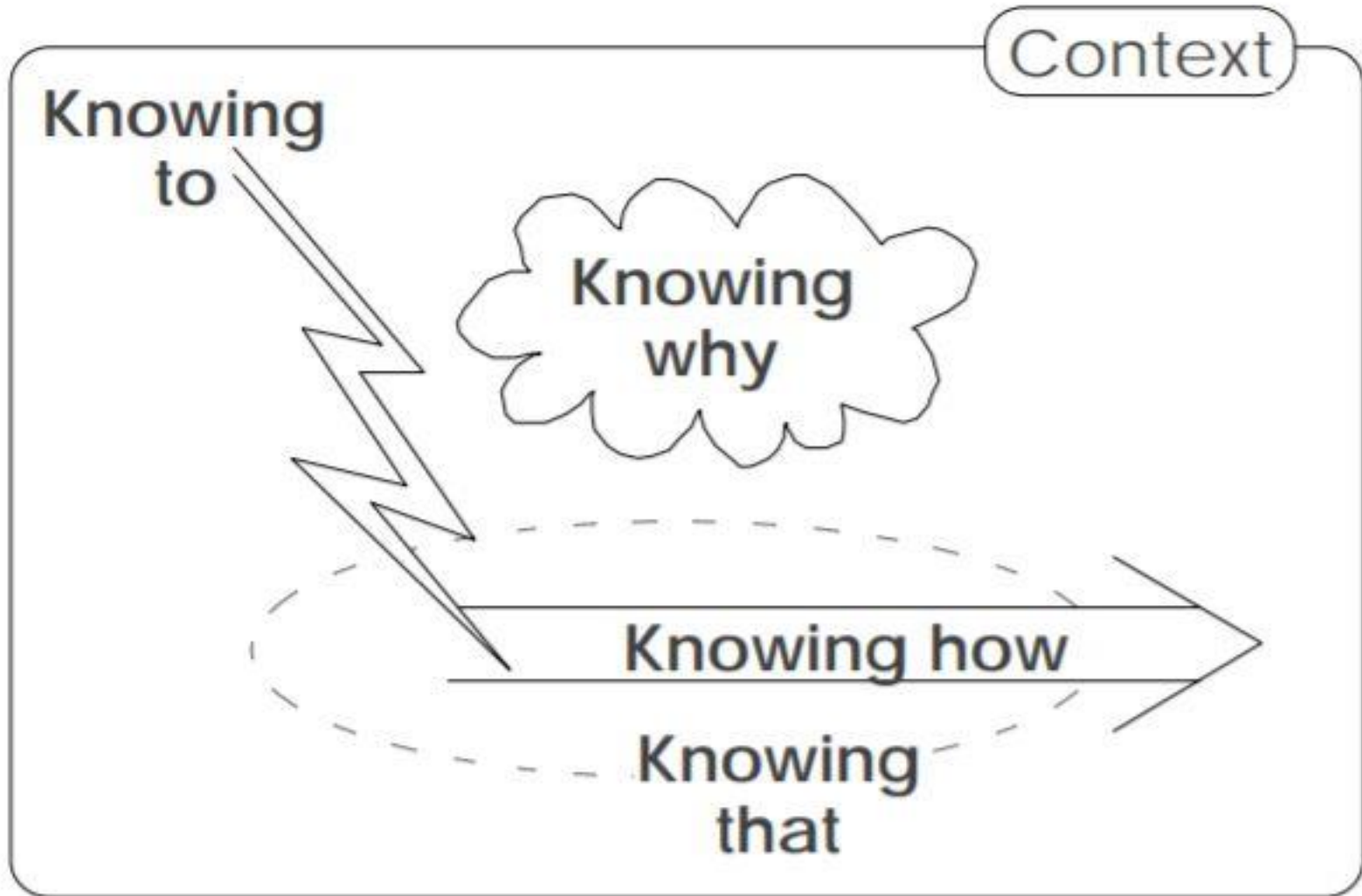
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## Beyond mere knowledge of mathematics: the importance of knowing-to act in the moment

- John Mason and Mary Spence 1999
- knowing that something (factual) is true;
- knowing how to do something, how to carry out some procedure;
- knowing why in the sense of having some stories I tell myself to account for something;
- knowing to act in the moment.



# Knowing that... Trigonometry

- What are all the trigonometrical facts we need to know?

# Knowing that... Trigonometry

- What are all the trigonometrical facts we need to know?
- Trig ratios
- Trig identities
- Trig graphs
- Trig functions
- Formulae involving trig



# Knowing how... Trigonometry

- What are the methods involving trigonometrical facts we need to know?

# Knowing how... Trigonometry

- What are the methods involving trigonometrical facts we need to know?
- Proving trig identities
- Substituting into formulae using trig
- Solving equations involving trig
- Calculus

# Knowing why... Trigonometry

- Why are these trig facts true?

## Examples

Why is  $\sin^2 \alpha + \cos^2 \alpha = 1$ ?

Why is  $\sin(A+B) \equiv \sin A \cos B + \sin B \cos A$ ?

# Knowing to... Trigonometry

- Which method do I use?

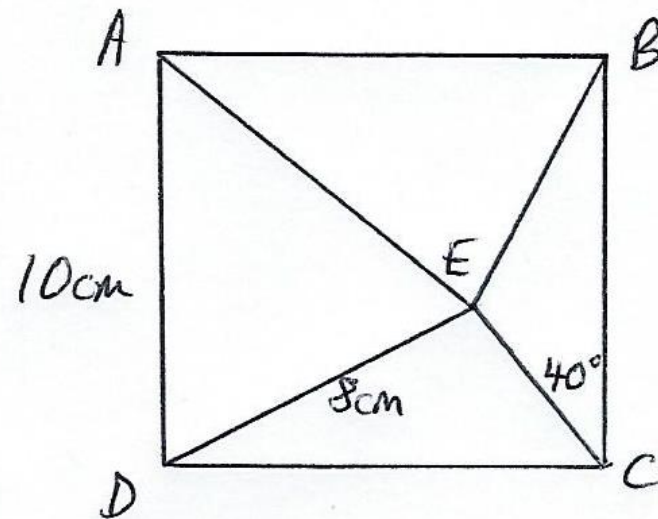
## Example

- Pythagoras' Theorem, trigonometry, sine rule or cosine rule?

ABCD is a square

Angle DEC is obtuse

Find the area of  
triangle AEB



# Knowing to... Trigonometry

- Which method do I use?

Example

The usual method is to convert to  $\sin \theta$  and  $\cos \theta$

as in prove that  $\frac{\operatorname{cosec} x - \cot x}{1 - \cos x} \equiv \operatorname{cosec} x$

But it is not the most efficient or sensible method for:

Prove  $\frac{\cos 3\theta}{\sin \theta} + \frac{\sin 3\theta}{\cos \theta} \equiv 2 \cot 2\theta, \quad \theta \neq (90n)^\circ, n \in \mathbf{Z}$

What is the most efficient method?

# Knowing to... Trigonometry

- Which method do I use?

## Example

These look similar but require different methods:

$$\int \cos^2 x \, dx \quad \text{and} \quad \int \cos^2 x \sin x \, dx$$



# Break time

Begin again at 17:15

# Can we do the same with another topic?

- Suggestion?



# Topic - Integration

Facts?

# Topic - Integration

- Is it a standard function?
- Is it reverse chain rule?
- Can you use a trig identity?
- Is it partial fractions?
- Is it of the form  $kf'(x)f(x)$  or  $kf^x[f(x)]^n$ ?
- Is it a substitution?
- Is it integration by parts?

# What else is on offer?

- Introduction to Mechanics - Friday 24<sup>th</sup> January – Thame
- KS4 Raising Confidence with Problem Solving – Thursday 30<sup>th</sup> January – Didcot
- Sample Core Maths lesson – Friday 31<sup>st</sup> January – The Warriner School
- Developing A level Pedagogy Work Group – Thursday 6<sup>th</sup> February – Chipping Norton
- A level Active! – Monday 9<sup>th</sup> March – High Wycombe
- Maths Feasts – Wednesday 18<sup>th</sup> March – Wheatley

# The next Coffee and Pi meeting

- Tuesday 17<sup>th</sup> March
- 2 for 2.30pm to 6pm
- Bring your own lunch, sandwich tea around 5pm
  
- Core Maths preliminary materials. We will look at past materials and exam questions. Then we will create questions to share for this year's materials.

# Contact the AMSP



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Advanced\_Maths

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