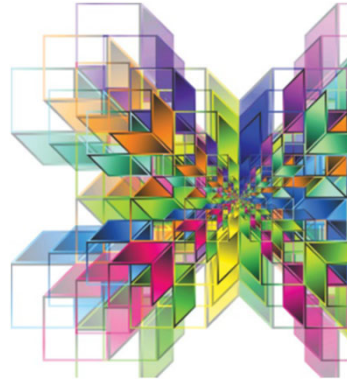


GCSE Maths: Teacher Virtual communities

Autumn 2021



Welcome



Today's event

- Overcoming maths anxiety and developing a growth mindset in your students.
- Problem solving – developing students' confidence and independence.
- Supporting students to learn effectively in classes with a range of prior knowledge.

Maths anxiety

Centre for Neuroscience in Education University of Cambridge

'Mathematics Anxiety is a negative emotional reaction to mathematics that can be debilitating.'

Centre for Neuroscience in Education, University of Cambridge

- It is recognised that maths anxiety is a separate issue from anxiety around taking tests in general.
- Maths anxiety is unique which can interfere with people's ability to manipulate numbers/solve mathematical problems.

What this can look like in our classrooms

- Students not wanting to verbally contribute answers or ask questions.
- Students preferring not to give a written answer rather than risk writing down an incorrect answer.
- Students trying to 'hide' mistakes.
- Students giving up.

Growth mindset

'The very best opportunities to learn come about when students believe in themselves.'

Jo Boaler, p5 *Mathematical Mindsets* 2016.

Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching by Jo Boaler, John Wiley & Sons Limited © 2015. Reproduced with permission of the Licensor through PLSclear.

Mindsets



Rephrasing thinking

If you hear yourself thinking



Tell yourself



If you hear yourself thinking



Tell yourself



If you hear yourself thinking



Tell yourself



Celebrate progress at every opportunity

You could show student's progress in places such as:

- classrooms
- assemblies
- corridor displays.

Activity 1

Which mindset do you model in your classroom?

Promotes a fixed mindset	Promotes a growth mindset
Praising students for being smart	Praising effort and strategies
Formative comments that emphasise achievement	Formative comments that emphasise effort and application
Praising students for achievements that come easily	Building robust self-confidence
Spending time documenting intelligence and ability	Spending time developing intelligence and ability
Directing students to which tasks to complete	Giving students a strong voice in the learning process and a sense of purpose
Boosting self-esteem	Providing constructive criticism
Place importance on grades/levels rather than learning	Place importance on learning rather than grades/levels

Problem solving

Encouraging students to attempt multistep problems

'Boxing up' or 'Information, Methods, Calculations, Answer (IMCA)' is a strategy for:

- working out (for writing)
- discussing (asking each other questions)
- thinking (asking yourself questions).

'Boxing up' or 'IMCA'

What is the question asking me?

*What **information** do I already have?*

*What **methods** or formulae will I be using? Will a diagram help?*

*What **calculations** / working out do I need to do?*

*How can I check that my **answer** is correct?*

Zeb Friedman. Originated from work done with Helen Hindle

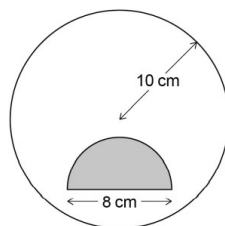
Activity 2

- Attempt to answer one of the AO3 questions using 'boxing up'.
- What strategies do you currently use in your classroom to support students to independently answer multistep questions?

Example question 1

Q9, Paper 1 (Higher), June 2019

A shaded semicircle is inside a circle as shown.



Not drawn
accurately

The **radius** of the circle is 10 cm

The **diameter** of the semicircle is 8 cm

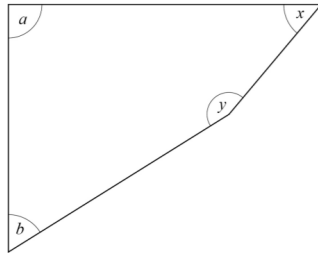
How many times bigger is the unshaded area than the shaded area?

[4 marks]

Example question 2

Q14, Paper 1 (Higher) June 2019

Here is a quadrilateral.



Not drawn accurately

$$a = 90^\circ \text{ and } a : b = 5 : 3$$

$$x : y = 1 : 3$$

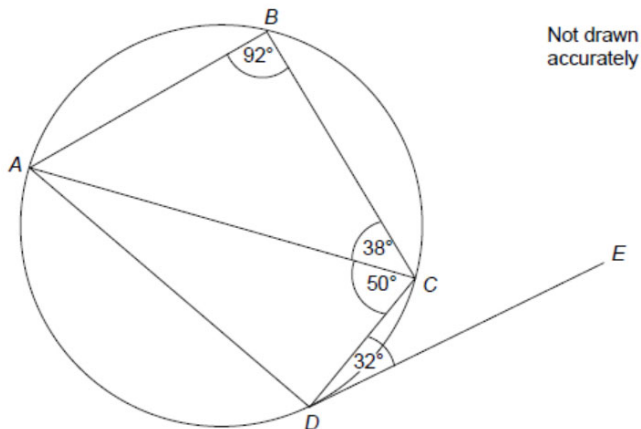
Show that $b = x$

[3 marks]

Knowledge range

Ask a question/make a comment – ‘do now’

Q24, Practice Paper 1, Paper 3 (Higher)



The role of learning journeys in promoting a growth mindset

Learning journeys/progress maps:

- give students a sense of purpose
- give students a strong voice in the learning process
- take students out of their comfort zone
- encourage students to challenge themselves
- place an emphasis on progress rather than attainment
- indicate to students what skills students need to work on in the future
- support differentiation in a class with a range of prior attainment without placing limits on learning.

Knowledge learning journeys/progress maps

	Foundation	Developing	Secure	Expert
<p>Y10 Knowledge Progress Map – Angle Facts & Circle Theorems</p> <p>a) Acute, Reflex, Obtuse and Right Angle</p> <p>I know the definitions of acute, obtuse, reflex and right angles. I know how to use a protractor to measure and draw angles.</p> <p>HM 455-459</p> <p>b) Properties</p> <p>I know the properties and definitions of: special types of triangles, of special types of quadrilaterals and other 2D shapes.</p> <p>HM 823, 824</p> <p>c) Sum</p> <p>I know the sum of the angles at a point, on a straight line, in a triangle and in a quadrilateral.</p> <p>HM 477 – 479 and HM 485 - 487</p>	<p>d) Parallel lines</p> <p>I know the definition of vertically opposite, corresponding, alternate and co-interior angles on parallel lines and I know the related angle facts.</p> <p>HM 480 – 483</p> <p>e) Regular Polygon and Irregular Polygon</p> <p>I know the formulae to calculate the interior and exterior angles in regular and irregular polygons.</p> <p>HM 560-564</p>	<p>f) Circle Theorems</p> <p>I know the different angle properties described by different circle theorems.</p> <p>HM 592-604</p>	<p>g) Proof</p> <p>I know that angle facts can be used to prove geometrical results.</p> <p>HM 603-604</p>	

Skills learning journeys/progress maps

	Foundation	Developing	Secure	Expert
<p>Y10 Skills Progress Map – Angle Facts & Circle Theorems</p> <p>Problem Solving – Construct Solutions / Solve</p>	I can solve single-step angle problems using my knowledge of angle facts.	I can solve multi-step problems using my knowledge of angle facts.	I can use my knowledge of circle theorems to solve single step problems.	I can use my knowledge of circle theorems to solve multi- step problems.
<p>Reasoning - Prove</p>	I can justify and give reasons by stating the simple angle facts I have used, when finding missing angles.	I can justify and give reasons by stating the angle facts I have used, when finding: <ul style="list-style-type: none"> - Missing interior and exterior angles of regular and irregular polygons. - Missing angles on parallel lines. 	I can justify and give reasons by stating circle theorems used to calculate missing angles in shapes inscribed (drawn) in circles.	I can use my knowledge of angle facts to algebraically prove circle theorems .

How we use learning journeys

	Foundation	Developing	Secure	Expert
Y10 Knowledge Progress Map – Angle Facts & Circle Theorems	<p>a) Acute, Reflex, Obtuse and Right Angle</p> <p>I know the definitions of acute, obtuse, reflex and right angles. I know how to use a protractor to measure and draw angles. Task 1 <i>HM 455-459</i></p> <p>b) Properties</p> <p>I know the properties and definitions of special types of triangles, of special types of quadrilaterals and other 2D shapes. Task 2 and Task 3 <i>HM 823, 824</i></p> <p>c) Sum</p> <p>I know the sum of the angles at a point, on a straight line, in a triangle and in a quadrilateral. Task 2 and Task 3 <i>HM 477 – 479 and HM 485 - 487</i></p>	<p>d) Parallel lines</p> <p>I know the definition of vertically opposite, corresponding, alternate and co-interior angles on parallel lines and I know the related angle facts. Task 4 <i>HM 480 – 483</i></p> <p>e) Regular Polygon and Irregular Polygon</p> <p>I know the formulae to calculate the interior and exterior angles in regular and irregular polygons. Task 5 and Task 6 <i>HM 560-564</i></p>	<p>f) Circle Theorems</p> <p>I know the different angle properties described by different circle theorems. Task 7 and Task 8 <i>HM 592-604</i></p>	<p>g) Proof</p> <p>I know that angle facts can be used to prove geometrical results. Task 9 <i>HM 603-604</i></p>

How we use learning journeys continued

- Pre-teaching mini assessment.
- Students select their task each lesson in reference to the learning journey.
- There are no limits on learning.
- An end of unit, full assessment is used to track progress through the unit.
- A 'think pink go green' feedback sheet is used to provide students an opportunity to learn from feedback.

Any questions?



Resources

Take advantage of our extra resources in the 'Plan', 'Teach' and 'Assess' sections of our website.

[Home](#) / [Subjects](#) / [Mathematics](#) / [GCSE](#) / [Mathematics \(8300\)](#) / [Teaching resources](#)

GCSE Mathematics

8300

[Specification](#)

[Planning resources](#)

[Teaching resources](#)

[Assessment resources](#)

[Key dates](#)

Event materials

The electronic materials from this event will be available to download shortly. If you aren't able to download them at this time, they will be made available to you in the customer portal of our online booking system.

Once we receive notification that you have attended the course, you will be sent a certificate of attendance email. When you receive the email, please log in to your account and the materials will be available on the 'my resources' tab on the welcome screen.

Get in touch

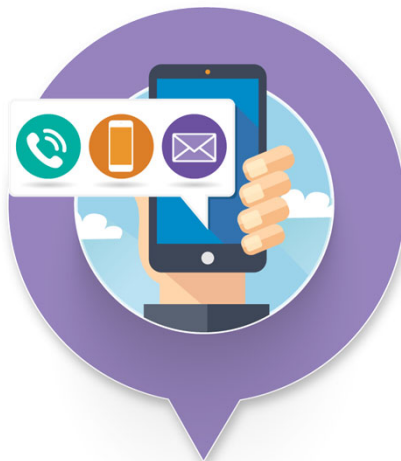
Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

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Thank you
