

GCSE MATHS

Virtual communities (Teacher)

Facilitation pack

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About this resource

We know that your time is limited, so we've designed this resource to make it easy for you to share what you've learned from our virtual community event.

This resource will enable you to deliver your own CPD session for your colleagues and it includes activities and resources linked to the virtual community topics to:

- remind you of the topics covered during the event so you can brief colleagues or run a similar session with your team
- provide follow on activities and discussion areas for you and your team so the content can be taken further and applied or embedded in your school or college.

Resources available

- A copy of the PowerPoint from the meeting with notes for the presenter
- Follow on pathways showing the topics covered during the meeting and ways to develop them
- A pre and post meeting confidence check questionnaire to benchmark confidence of colleagues around the topic of your session.

We hope this gives you the opportunity to make the most of the time you invested in attending the event.

Follow-on pathways

This section takes topics, discussion or activities from the virtual communities meeting and provides suggestions of areas for development and follow-on activities you can do with your colleagues.

Activity 1: Overcoming maths anxiety

- Look at the eight strategies for overcoming maths anxiety/promoting a growth mindset.
- Consider/discuss what this looks like in your classrooms, what small changes could you make in your classroom to promote a growth mindset?

Activity 2: Developing students' confidence and independence when problem solving

- Look at the examples of AO2 and AO3 questions with the 'boxing up' template below.
- Attempt to solve each question using 'boxing up'.
- Is 'boxing up' a strategy that you think would work well with your students? If so, how will you share this strategy with them?

Activity 3: Encouraging all students to contribute during lessons

- Look at the examples of the 'ask a question/make a comment', 'do now' activities.
- Consider/discuss the range of responses the students in your classes might give.
- Design your own 'ask a question/make a comment', 'do now' activities by adapting questions from Exampro.

Activity 4: Using progress maps to enable students to regulate their learning

- Look at the progress maps provided in this pack.
- Discuss the ways in which you could use these in your lessons.
- Attempt to create a progress map for a future unit of work, alternatively look at the progress maps available on <u>mixedattainmentmaths.com</u> and adapt one of these to suit a future unit of work.

Confidence checks

Rate the area of development statements according to your confidence where 0 is not confident at all and 5 is very confident.

Before the meeting

	Rating	Reasons/notes
Objective 1: Maths anxiety I know strategies to help overcome maths anxiety in students.		
Objective 2: Problem solving I know strategies to develop students' confidence and independence when problem solving.		
Objective 3: Range of prior knowledge I know strategies to support students to learn effectively in classes with a range of prior knowledge.		

Activity 1: Overcoming maths anxiety

Here are some strategies that you could use for developing a growth mindset/overcoming maths anxiety in the classroom:

- 1. Give students a strong voice in the learning process and a sense of purpose.
- 2. Encourage students to reflect on how they learn and how they can develop their skills as learners.
- 3. Encourage students to reflect on their progress and how to improve.
- 4. Build resilience by supporting students to develop and use strategies when they get stuck.
- 5. Ensure that feedback is formative and includes a dialogue between student and teacher and student and peer.
- 6. Celebrate mistakes as opportunities to move learning forward.
- 7. Promote the language of the 'growth mindset'.
- 8. Celebrate effort and progress over attainment.

The image below is an example of a sticker that you could put on the front of students' books to remind them of this style of classroom ethos. This is one of the cultures of learning that you could promote in your classroom to help students overcome maths anxiety and encourage a growth mindset.



Activity 2: Developing students' confidence and independence when problem solving

'Boxing up' is a 'talk for writing' which enables students to self scaffold multistep, functional, 'wordy' or AO3 problems.

The next four pages have examples of AQA exam questions and the 'boxing up' template so that you can try this strategy with a class.

What is the
question asking
me?What methods
or formulae
will I be using?
Will a diagram
help?What information
do I already have?How can I check that
my answer is correct?

Zeb Friedman. Originated from work done with Helen Hindle

In an office there are twice as many females as males.

 $\frac{1}{4}$ of the females wear glasses.

 $\frac{3}{8}$ of the males wear glasses.

84 people in the office wear glasses. Work out the number of people in the office.

June 2017, Paper 1 (Higher), Question 25

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?

Hanif makes green paint by mixing blue paint and yellow paint in the ratio blue : yellow = 7 : 3 He buys blue paint in 50-litre containers, each costing £225 He buys yellow paint in 20-litre containers, each costing £80 He wants to sell the green paint in 5-litre tins He wants to make 40% profit on each tin. How much should he sell each tin for?

June 2019, Paper 3 (Higher), Question 21

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?



June 2019, Paper 3 (Foundation), Question 10

What is the question asking me?	What methods or formulae will I be
What information do I already	using?
have?	Will a diagram help?
What calculations/working out do I need to do?	How can I check that my answer is correct?



June 2019, Paper 2 (Higher), Question 19

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What is the question asking me?	What methods or formulae will I be
What information do I already	using?
have?	Will a diagram help?
What calculations/working out do I need to do?	How can I check that my answer is correct?

Activity 3: Encouraging all students to contribute during lessons

In a class with a wide range of prior knowledge, it is useful to start with an open discussion point that is accessible to all students.

- Open discussion points provide opportunities for students to explain their reasoning and ensure that all students can contribute in a meaningful way.
- They are a great way for teachers to assess prior understanding and identify and address misconceptions.

Whilst the students are thinking about the discussion point, it's really helpful to circulate the room listening to students' conversations and noticing what they are writing down. This will help you to identify which students to call upon to contribute first, so that each contribution builds upon the previous ones.

You may also consider it useful to think about the types of questions and comments you'd expect to hear and the type of misconceptions students commonly have. This could prepare you to respond to students' contributions, draw out any key ideas and make sure they are shared.

Below are some examples of AQA Exampro questions which have been turned into 'ask a question/make a comment' discussion points. These diagrams can be used in a lesson by displaying them on the board and inviting students to either ask you something about the diagram or tell you something that they know or can work out.

How might the students in your class respond when invited to ask a question or make a comment about each diagram?



Activity 4: Using progress maps to enable students to regulate their learning

Progress maps are a useful tool in classes with a range of prior knowledge as they enable the teacher to be aware of each individual student's prior knowledge of a topic at the start of a unit of work. They also enable the teacher to track individual progress across a unit of work and therefore, ensure that all students are supported and challenged.

Progress maps make progress visible to students, they can 'see' themselves developing new knowledge and skills over time and they enable students to regulate their own learning by making the next steps in learning clear.

How to use progress maps:

- 1. Students complete a mini assessment at the start of a unit of work to identify their start point on the progress map.
- 2. Students then choose their task each lesson based upon what they need to learn next in order to make progress. (It is very important that students do not all start on task one and work their way through the easier tasks in order to reach the harder tasks.)
- 3. Students tick and date the statements from the progress map when they feel that they have developed each skill/knowledge.
- 4. The teacher should encourage students to select tasks for themselves and foster a classroom culture in which students seek challenge.
- 5. It remains the teacher's responsibility to monitor task choice and redirect students who have selected inappropriately.
- 6. Students are assessed again at the end of each unit of work. The teacher and the students can then compare the start of unit and end of unit progress map to see which skills/knowledge the student gained and developed across the unit of work.

The next three pages contain examples of progress maps, you can also find further progress maps, including the pre-teaching mini assessments and the end of unit assessment tasks on <u>mixedattainmentmaths.com</u>

Foundation	Developing	Secure	Expert
a) <u>Collecting Like Terms</u> (revision) I know how to simplify expressions by collecting it terms. HM 156, 157, 158, 159 b) <u>Solve simple equations</u> I know how to solve simpliand two step linear equal with unknowns on one side the equals sign. HM 177, 178, 179, 180, 14 182, 183 c) <u>Substitution</u> (revision) I know how to substitute to into an expression. HM 780, 781, 782, 783, 74	d) Expand and Factorise (revision) I know how to expand a single bracket. I know how to simplify expressions by factorising. HM 160, 168, 169, 170, 171 e one tions le of B1, B1, HM 184-186	f) <u>Simple Simultaneous</u> <u>Equations</u> I know how to solve linear simultaneous equations. <i>HM 190, 191, 192, 193, 194</i> g) Solve Quadratic Equations (Factorising) I know how to solve quadratic equations algebraically by factorising. HM 230, 231, 232, 233	 h) Linear and Quadratic I know how to solve simultaneous equations when one is linear and one is quadratic. <i>HM 246</i> i) <u>Completing the Square</u> I know how to solve quadratic equations that require rearrangement by completing the square. HM 235, 236, 237, 238, 239 I know how to find turning points by completing the square. HM 256 j) <u>Quadratic Formula</u> I know how to use the quadratic formula to solve quadratic equations. <i>HM 240, 241, 242</i>

		Foundation	Developing	Secure	Expert
		a) I can form and solve linear equations with unknowns on one side of the = sign.	b) I can form and solve linear equations with unknowns on both sides of the = sign.	c) I can form and solve simultaneous equations and interpret the solution.	d) I can form and solve quadratic equations and interpret the solution.
Y10 Skills Progress Map – Equation:	Problem Solving - Model	HM 188	HM 188	HM 195	HM 195

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

		Foundation	Developing	Secure	Expert
Angle Facts & Circle Theorems	Problem Solving – Construct Solutions / Solve	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.
Y10 Skills Progress Map – 7	Reasoning - Prove	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: 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.

	Foundation	Developing	Secure	Expert
Y10 Knowledge Progress Map – Ratio and Proportion	 a) <u>Compare Ratios</u> I know how to compare quantities using ratios <i>HM 328</i> b) <u>Simplify</u> I know how to simplify ratios <i>HM 329</i> c) <u>Fractions</u> I know how to write ratios as fractions/ proportions. <i>HM 330</i> d) <u>Sharing Ratios</u> I know how to share an amount into a given ratio <i>HM 332, 333, 334</i> 	 e) <u>Ratio Forms</u> I know how to write ratios in the form 1:n or n:1. <i>HM 331</i> f) <u>Direct and Inverse</u> Proportion I know different methods to solve simple problems involving direct and inverse proportion. For example: the unitary method, scaling up and down and the box method. <i>HM 339, 340, 341, 342, 343</i> g) <u>Multi-Step Problems</u> I know different methods for solving multi-step problems involving ratios and / or using other areas of maths, e.g. angle facts etc <i>HM 335, 336, 337</i> 	 h) <u>Direct and Inverse</u> <u>Algebraic Proportion (∞)</u> l know how to express direct and indirect proportion as equations with 'k' as the constant of proportionality. l know how to find the constant of proportionality. l know how to substitute values into these equations to solve direct and inverse proportion problems. <i>HM 343, 344, 345, 346, 347</i> i) <u>Algebra and Ratio</u> l know different methods for solving ratio problems involving algebra. For example: scaling up and forming equations. <i>HM 338</i> 	 i) <u>Three Variables</u> I know a method/ methods to solve problems involving direct and inverse proportion in 3 variables. k) <u>Graphs and Proportion</u> I know how to solve problems involving graphs and algebraic proportion <i>HM 348</i>

		Foundation	Developing	Secure	Expert
Y10 Skills Progress Map – Ratio and Proportion	Reasoning - Connect	a1) I can make connections between ratios and fractions.	b1) I understand how number, ratio and proportion are connected and I can use these connections to solve problems.	c1) I can formulate proportional relationships algebraically.	d1) I can connect algebraic and graphical representations of proportional relationships.
	Problem Solving - Translate	a2) I can follow a mathematical process to solve a ratio or proportion problem.	b2) I can decide upon a mathematical process and use it to solve a ratio or proportion problem.	c2) I can decide upon a series of mathematical processes and use them to solve a ratio or proportion problem.	d2) I can solve problems using algebraic and graphical representations of proportional relationships.

Confidence checks

After the meeting

	Rating	Reasons/notes
Objective 1: Maths anxiety I know strategies to help overcome maths anxiety in students.		
Objective 2: Problem solving I know strategies to develop learners' confidence and independence when problem solving.		
Objective 3: Range of prior knowledge I know strategies to support students to learn effectively in classes with a range of prior knowledge.		

Planning for the future

Questions for consideration

What areas have you identified as strengths using the confidence check?

How might you develop these further?

What areas have you identified as areas for development?

How might you build confidence in these areas?

How might some of the learning from the virtual community/CPD session impact your department?

What changes could you make based on outcomes of the CPD session?

Notes

Contact us

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

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