

## Ratio, Proportion & Algebra: outline programme and trainer notes

### Notes to trainer:

The overall aim for the day is to introduce participants to active and participative ways of working with students on GCSE Maths Ratio, proportion & algebra topics at Foundation level and to help them appreciate why this has more potential for success than simply giving them more practice in the way they were taught previously.

There may be more suggested activities than you can get through in the day and it may be necessary to adjust the session to the needs of the group.

Extension activities for more capable delegates are included. Please ensure that participants have sufficient time to discuss as a group the basic principles even if the more capable ones have moved on. Remind them all that quick is not necessarily correct!!

### Source material and how participants might find it will be included in the Participant Handbook

Suggested timings	Session title	Slides	Additional resources required	Support activity for those who are struggling	Extension activity for the high flyers	Notes
09:30 – 10:00	<b>Arrival, refreshments &amp; registration + starter activity</b>	1,2	Register  Copies of the GCSE mathematics subject content & assessment objectives (pp.6—9)	Work individually or collaborate with others as arrive	1. Second ‘mind reading’ problem (HO1)	Have copies of GCSE content & assessment specs available on each table for reference.
10:00- 10:15	<b>Introductions &amp; outlines of the day</b>	3, 4, 1	Participant Handbook			Ask table groups to introduce each other. Aims & content of the day. Brief feedback on starter activity ( <i>this will be returned to later in the session</i> )
10:15- 10:35	<b>Session 1: At the chip shop</b> Algebra basics – substitution, simplifying & factorising.	5-16	2. At the Chip Shop (HO2)  Mini-whiteboards, pens, erasers	Check responses on mini-whiteboards & address any errors/misconceptions	Ask to think of ideas to extend the activity in relation to the context.	Structure the session using slides 5-16, in line with the trainer handbook. Remind throughout that we are talking about <i>prices</i> of items. At the end, check understanding of key vocabulary – substitute, simplify & factorise.

10:35-11:10	<b>Session 2: interpreting algebraic expressions</b>	17-20	3. ILIM A1: Interpreting algebraic expressions (card sets A,B,D – p.5,6,8) Mini-whiteboards, pens, erasers	Check responses on mini-whiteboards. Ensure that groupings contain a mix of levels to allow peer support.	Match extra card set C (p.7) to A & B	See full instructions in downloaded resource: <a href="http://www.nationalstemcentre.org.uk/elibrary/resource/1998/interpreting-algebraic-expressions-a1">http://www.nationalstemcentre.org.uk/elibrary/resource/1998/interpreting-algebraic-expressions-a1</a>
11:10-11:20	<b>Reflection</b>	21				Ask participants to discuss the questions on slide 21 in table groups. Take brief feedback from each table.
11:20-11:35	BREAK					
11:35-12:15	<b>Session 3: Solving linear equations</b>	22-26	4. Maths Assessment Project – Solving Linear Equations (Card sets: stories, equations & steps to solving) Mini-whiteboards, pens, erasers. Flipchart sheets & markers	Ensure that groupings contain a mix of levels to allow peer support.	Ask delegates to create their own maths stories with matching equations.	See full instructions in downloaded resource: <a href="http://map.mathshell.org/lessons.php?unit=7220&amp;collection=8">http://map.mathshell.org/lessons.php?unit=7220&amp;collection=8</a>
12:15-12:50	<b>Session 4: Developing proportional reasoning</b>	27-34	5. Maths Assessment Project - Classifying proportion & non-proportion situations (Card sets: Direct proportion or not?, Swapping questions) 6. Properties of direct proportion (HO3) Mini-whiteboards, pens, erasers.	Ensure that groupings contain a mix of levels to allow peer support.  Delegates can choose level to pitch own questions.	Delegates can choose level to pitch own questions.	See full instructions in downloaded resource: <a href="http://map.mathshell.org/lessons.php?unit=7215&amp;collection=8">http://map.mathshell.org/lessons.php?unit=7215&amp;collection=8</a>

12:50-13:00	<b>Reflection</b>	35				Ask participants to discuss the questions on slide 35 in table groups. Take brief feedback from each table.
13.00 – 13.30	LUNCH					
13:30-14:10	<b>Session 5: Exploring straight line graphs</b>	36-40	GeoGebra or similar graphing application, or use 'Maths is Fun' webpage.  7. Plotting graphs of equations (HO4)  8. Cards sets: graphs, equations, contexts  Mini-whiteboards, pens & erasers  Graph paper, rulers & pencils	HO4 is low entry/high ceiling – delegates can explore basic in more detail.	HO4 delegates can explore higher level function – e.g. quadratics.  Match extra card set: tables  Create matching own card sets with blanks	'Maths is Fun' website has a built in app for straight-line graphs: <a href="https://www.mathsisfun.com/data/straight_line_graph.html">https://www.mathsisfun.com/data/straight_line_graph.html</a>
14:10-14:40	<b>Session 6: Comparing approaches</b>	41-43	9. Football shirts (HO5)  10. Sample responses to discuss  Mini-whiteboards, pens & erasers	Low entry/high ceiling activity – delegates can contribute according to their level of understanding & personal preferences.		See full instructions in downloaded resource: <a href="http://map.mathshell.org/lessons.php?unit=8200&amp;collection=8">http://map.mathshell.org/lessons.php?unit=8200&amp;collection=8</a>
14:40-14:50	<b>Reflection</b>	44				Ask participants to discuss the questions on slide 44 in table groups. Take brief feedback from each table.
14:50-15:00	BREAK					
15:00-15:25	<b>Session 7: Sequences</b>	45-50	10. Looking at structure (HO6)  Mini-whiteboards, pens & markers	Ensure that groupings contain a mix of levels to allow peer support.	Encourage delegates to make up their own sequences & find the formula of the nth term.	

15:25-15:50	<b>Session 8: Exploring exam questions</b>	51-52	Selection of ratio, proportion & algebra GCSE (2016) questions (foundation tier)  Flipchart sheets & markers	Encourage delegates to choose questions that present an appropriate level of personal.	
15.50 – 16.00	Review, evaluations & CLOSE	53-54	Evaluation forms		