



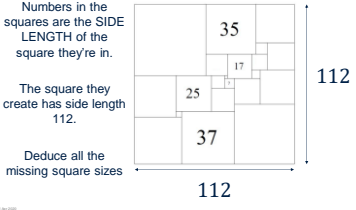
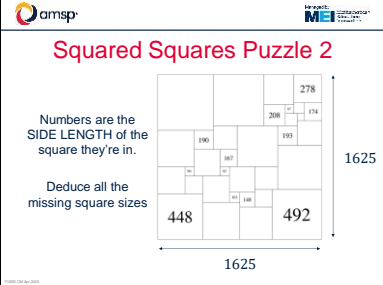

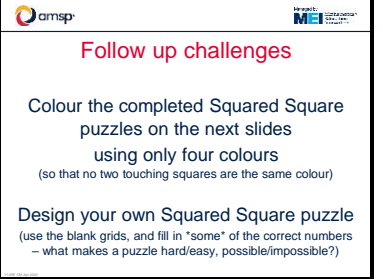
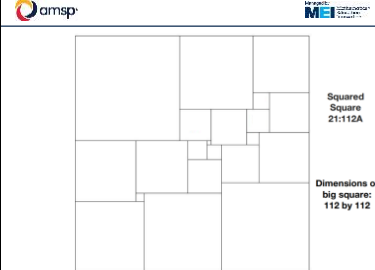
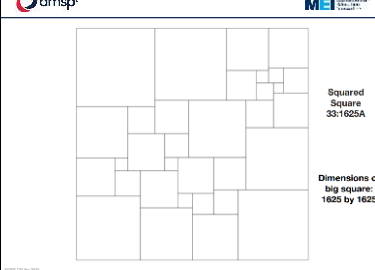
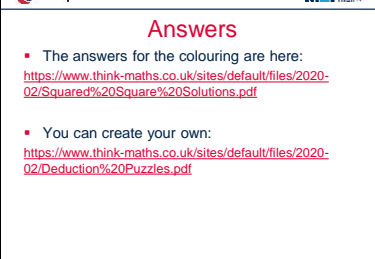
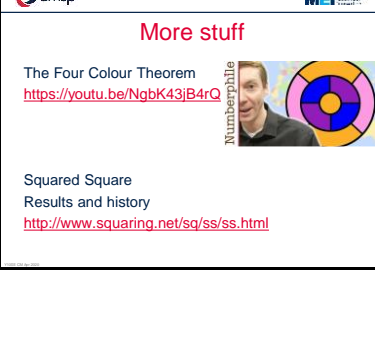



Slide 1	 <p>Advanced Mathematics Support Programme®</p>	
Slide 2	 <p>Squared Squares</p>	
Slide 3	 <p>Squared Squares</p> <p>Inspired by</p> <p>Numberphile: https://www.numberphile.com/</p> <p>and</p> <p>ThinkMaths: https://www.think-maths.co.uk/</p>	Both websites are excellent sources of mathematical enrichment and curiosities. Specific links are on the relevant slides
Slide 4	 <p>Squared Squares Puzzle 1</p> <p>Numbers in the squares are the SIDE LENGTH of the square they're in.</p> <p>The square they create has side length 112.</p> <p>Deduce all the missing square sizes</p> 	<p>The first puzzle. We suggest starting with this, as once students have had a play with this sort of thing the video has more appeal.</p> <p>The square itself is special (when solved!) as it is the smallest possible squared square (i.e. the square built with the fewest squares) – which James discusses in the video.</p> <p>It is both a nice puzzle and a chance to grapple with an interesting mathematical object in its own right.</p> <p>Students can hopefully make a start by (for example) spotting the full vertical height is 112 and that the 35, 25, 37 squares, and one unknown square should make up this height. Similar tactics follow and allow the whole square to be solved. Algebra can be used to represent particular unknowns if a formal approach is wanted/useful. (e.g. $35+25+37+x=112$)</p>

<p>Slide 5</p>	 <p>Numbers are the SIDE LENGTH of the square they're in. Deduce all the missing square sizes</p>	<p>The second puzzle. Slightly longer, and a bit more challenging harder. You could make this one optional.</p> <p>A possible starting point is (for example) near to the top right, the square above 208 & 87 must have a side length of $208+87=295$ since it lines up perfectly.</p> <p>This time the squared square is special for a different reason – it is categorised as 33:1625A (33 for the no. of squares, and 1625 for the side length of large square), and it's the “nicest” yet found – which means it has the smallest ratio between largest and smallest sub-squares – this helps all the elements remain visible (many squared squares need very large sub-squares and also very small sub-squares which make it hard to see both at once).</p>
<p>Slide 6</p>	 <p>Watch the Video</p> <p>https://youtu.be/NoRjwZomUK0</p>	<p>James and Brady's video from 2017 https://youtu.be/NoRjwZomUK0</p> <p>There's a follow up with extra detail: https://www.youtube.com/watch?v=I0peG_kRE-4</p> <p>You might want to suggest that students send you a short paragraph on what they found most surprising or interesting about the video, as a way of motivating them to watch it carefully, but without generating marking.</p>
<p>Slide 7</p>	 <p>Follow up challenges</p> <p>Colour the completed Squared Square puzzles on the next slides using only four colours (so that no two touching squares are the same colour)</p> <p>Design your own Squared Square puzzle (use the blank grids, and fill in "some" of the correct numbers – what makes a puzzle hard/easy, possible/impossible?)</p>	<p>These might be considered as optional extras, suggested by Zoe Griffiths at ThinkMaths.</p> <p>The colouring exercise is a relatively easy exercise but which is skirting on the edges of deep mathematics: The four-colour theorem is a famous easy-to-state-hard-to-prove theorem – James Grime also did a video on it here: https://youtu.be/NgbK43jB4rQ</p> <p>Answers to the original puzzles, and colouring examples are on the Think Maths page (or directly here: https://www.think-maths.co.uk/sites/default/files/2020-02/Squared%20Square%20Solutions.pdf)</p> <p>Designing your own puzzle from the blank grids available here https://www.think-maths.co.uk/sites/default/files/2020-02/Deduction%20Puzzles.pdf is a challenge. Remove too much information and it might be impossible to solve from just the numbers, remove too little and it's trivial. Students who want to grapple with this will have to think about the logic of what can be removed while keeping it solvable.</p>

Slide 8	 <p>Squared Square 21:112A</p> <p>Dimensions of big square: 112 by 112</p>	
Slide 9	 <p>Squared Square 33:1625A</p> <p>Dimensions of big square: 1625 by 1625</p>	
Slide 10	 <p>Answers</p> <ul style="list-style-type: none"> The answers for the colouring are here: https://www.think-maths.co.uk/sites/default/files/2020-02/Squared%20Square%20Solutions.pdf You can create your own: https://www.think-maths.co.uk/sites/default/files/2020-02/Deduction%20Puzzles.pdf 	
Slide 11	 <p>More stuff</p> <p>The Four Colour Theorem https://youtu.be/NgbK43jB4rQ</p> <p>Squared Square Results and history http://www.squaring.net/sq/ss/ss.html</p>	<p>The first link is to James Grime's Four Colour Theorem Numberphile video: The Four Colour Theorem https://youtu.be/NgbK43jB4rQ</p> <p>The other links show how much has been done on Squared Squares Squared Square results and history http://www.squaring.net/sq/ss/ss.html https://en.wikipedia.org/wiki/Squaring_the_square</p>
Slide 12	 <p>Contact the AMSP</p> <p>☎ 01225 716 492</p> <p>@ admin@amsp.org.uk</p> <p>🖱 amsp.org.uk</p> <p>🐦 Advanced_Maths</p>	<p>Stay informed about the AMSP and receive updates: https://amsp.org.uk/subscribe</p>