
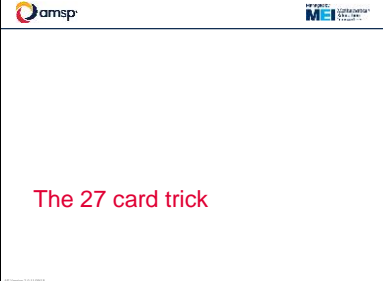
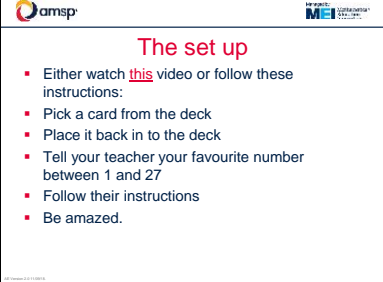
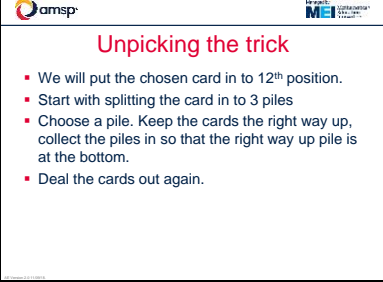
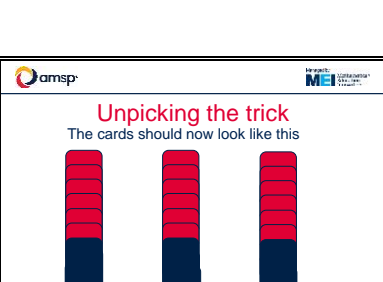
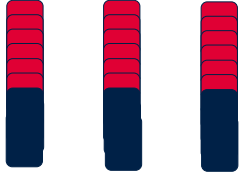
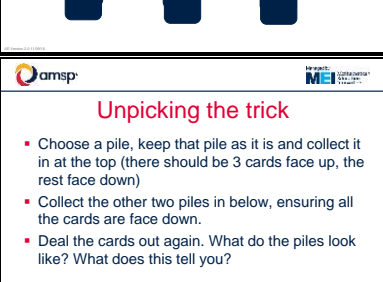
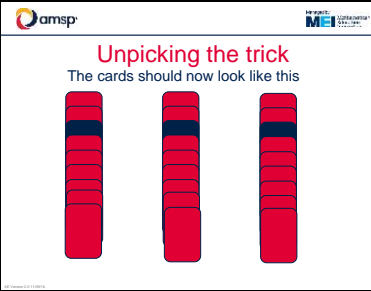
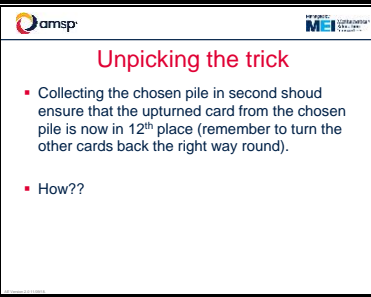
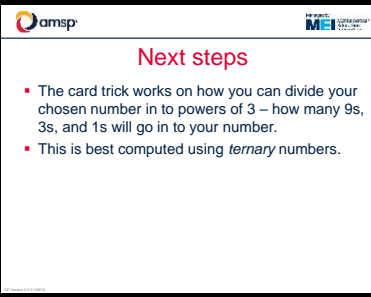
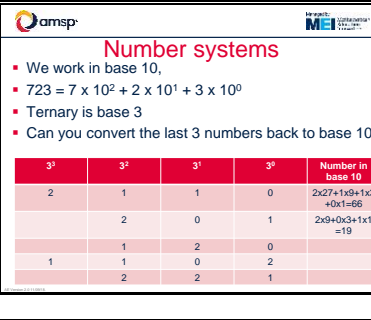
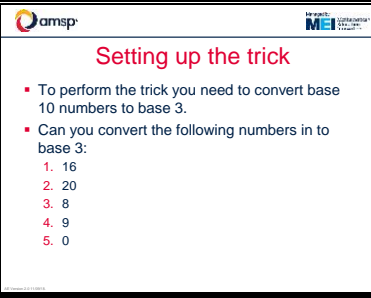
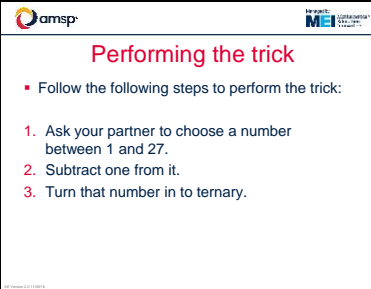



Slide 1	 <p>Advanced Mathematics Support Programme®</p>	
Slide 2	 <p>The 27 card trick</p>	<p>There are two nice videos here that explain the 27 card trick and an extension. This session would work best following the 21 card trick session.</p>
Slide 3	 <p>The set up</p> <ul style="list-style-type: none"> Either watch this video or follow these instructions: Pick a card from the deck Place it back in to the deck Tell your teacher your favourite number between 1 and 27 Follow their instructions Be amazed. 	<p>Make sure you stop the video at the reveal of the card trick (3:11). If you can, demonstrating the card trick using a visualiser enables you to hook students in. It is a quick trick to perform, you can decide how deliberately you want to show how you are collecting the piles up.</p>
Slide 4	 <p>Unpicking the trick</p> <ul style="list-style-type: none"> We will put the chosen card in to 12th position. Start with splitting the card in to 3 piles Choose a pile. Keep the cards the right way up, collect the piles in so that the right way up pile is at the bottom. Deal the cards out again. 	<p>Make sure that through this unpicking the trick, students are turning over and turning back the cards appropriately. This can encourage them to see how the trick unfolds – and for those that have already seen the 21 card trick, it is very quickly understood the benefit of having a number of cards that is divisible by 3 and 9.</p>
Slide 5	 <p>Unpicking the trick The cards should now look like this</p> 	<p>This arrangement is from 1st pile then 2nd pile.</p>
Slide 6	 <p>Unpicking the trick</p> <ul style="list-style-type: none"> Choose a pile, keep that pile as it is and collect it in at the top (there should be 3 cards face up, the rest face down) Collect the other two piles in below, ensuring all the cards are face down. Deal the cards out again. What do the piles look like? What does this tell you? 	

<p>Slide 7</p>		<p>This arrangement is from 1st pile then 2nd pile.</p>																														
<p>Slide 8</p>		<p>You could ask what effect collecting your chosen pile in 1st, 2nd or 3rd would have on the ending number. Encourage students to realise that there's a difference of 9 between the three possible outcomes.</p>																														
<p>Slide 9</p>																																
<p>Slide 10</p>	 <table border="1" data-bbox="220 1131 580 1265"> <thead> <tr> <th>3³</th> <th>3²</th> <th>3¹</th> <th>3⁰</th> <th>Number in base 10</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>1</td> <td>1</td> <td>0</td> <td>2x27+1x9+1x3+0x1=86</td> </tr> <tr> <td></td> <td>2</td> <td>0</td> <td>1</td> <td>2x9+0x3+1x1=19</td> </tr> <tr> <td></td> <td>1</td> <td>2</td> <td>0</td> <td></td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>2</td> <td></td> </tr> <tr> <td></td> <td>2</td> <td>2</td> <td>1</td> <td></td> </tr> </tbody> </table>	3 ³	3 ²	3 ¹	3 ⁰	Number in base 10	2	1	1	0	2x27+1x9+1x3+0x1=86		2	0	1	2x9+0x3+1x1=19		1	2	0		1	1	0	2			2	2	1		<p>15,38,25 You could ask students why there are only the digits 0,1 and 2 in the columns. You could extend this to asking what the greatest digit would be in base 4,5,6 etc (and what the greatest digit is in base 10).</p>
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<p>Slide 12</p>																																

<p>Slide 13</p>	<p>amsp <small>MEMBERSHIP OF THE MATHEMATICAL EDUCATION SOCIETY</small></p> <h3>Performing the trick</h3> <ul style="list-style-type: none"> Reverse your number and use the diagram below to work out where to place the chosen piles <table border="0"> <tr> <td></td> <td style="text-align: center;">3^0</td> <td style="text-align: center;">3^1</td> <td style="text-align: center;">3^2</td> </tr> <tr> <td>0</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Red Box]</td> </tr> <tr> <td>1</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Red Box]</td> </tr> <tr> <td>2</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Red Box]</td> </tr> <tr> <td></td> <td style="text-align: center;">First round</td> <td style="text-align: center;">Second round</td> <td style="text-align: center;">Third round</td> </tr> </table>		3^0	3^1	3^2	0	[Red Box]	[Red Box]	[Red Box]	1	[Red Box]	[Red Box]	[Red Box]	2	[Red Box]	[Red Box]	[Red Box]		First round	Second round	Third round	
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<p>Slide 14</p>	<p>amsp <small>MEMBERSHIP OF THE MATHEMATICAL EDUCATION SOCIETY</small></p> <h3>Performing the trick</h3> <ul style="list-style-type: none"> Example: <ul style="list-style-type: none"> Number chosen = 16. $16 - 1 = 15$. $15 = 0 \times 3^0 + 2 \times 3^1 + 1 \times 3^2 = 021$ You collect the indicated pile in the top, then bottom, then middle pile <table border="0"> <tr> <td></td> <td style="text-align: center;">3^0</td> <td style="text-align: center;">3^1</td> <td style="text-align: center;">3^2</td> </tr> <tr> <td>0</td> <td style="text-align: center;">[Dark Blue Box]</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Red Box]</td> </tr> <tr> <td>1</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Dark Blue Box]</td> </tr> <tr> <td>2</td> <td style="text-align: center;">[Red Box]</td> <td style="text-align: center;">[Dark Blue Box]</td> <td style="text-align: center;">[Red Box]</td> </tr> <tr> <td></td> <td style="text-align: center;">First round</td> <td style="text-align: center;">Second round</td> <td style="text-align: center;">Third round</td> </tr> </table> <p>Your chosen card will now be in the 16th position</p>		3^0	3^1	3^2	0	[Dark Blue Box]	[Red Box]	[Red Box]	1	[Red Box]	[Red Box]	[Dark Blue Box]	2	[Red Box]	[Dark Blue Box]	[Red Box]		First round	Second round	Third round	
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<p>Slide 15</p>	<p>amsp <small>MEMBERSHIP OF THE MATHEMATICAL EDUCATION SOCIETY</small></p> <h3>Now practise!!</h3> 																					
<p>Slide 16</p>	<p>amsp <small>MEMBERSHIP OF THE MATHEMATICAL EDUCATION SOCIETY</small></p> <h3>Extending the trick</h3> <ul style="list-style-type: none"> With 27 cards, we split them in to 3 piles 3 times as $3^3 = 27$. What if we had 25 cards? What if we had 49 cards? What if we had 1,000 cards? How long would it take you to carry out the trick? Can you put your chosen card in to 16th place out of 25 cards? (You will need to work in base 5) 																					
<p>Slide 17</p>	<p>amsp <small>MEMBERSHIP OF THE MATHEMATICAL EDUCATION SOCIETY</small></p> <h3>Contact the AMSP</h3> <ul style="list-style-type: none"> ☎ 01225 716 492 @ admin@amsp.org.uk 🖱 amsp.org.uk 🐦 Advanced_Maths 																					