




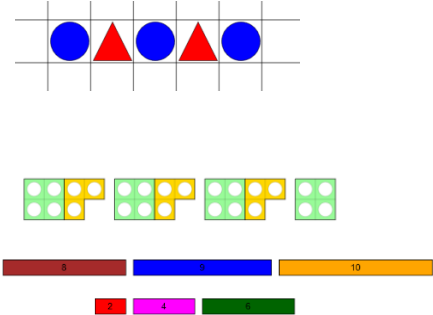
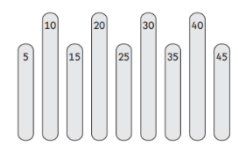


## Apley Wood Problem Solving Progression – Patterns and Rules

### EYFS

Key Skills and Strategy Development EYFS	Question stems	
Spot the pattern/rule and describe it mathematically.	Is this a repeating pattern? Is this a step size, following a rule? Can you describe it mathematically?	
Design a process or arithmetic strategy using the rules	What arithmetic knowledge will you use?	
Prove mathematically	What will the proof look like?	
Example problems	Model answers	Links
<p><b>Early Years Activities - Pattern</b></p> <div style="display: flex; flex-direction: column; gap: 10px;"> <div style="border: 1px solid #ccc; padding: 5px;">  <p><b>Pattern Making</b> Age 3 to 5</p> <p>In this activity, there are lots of different patterns for children to make, describe and extend.</p> </div> <div style="border: 1px solid #ccc; padding: 5px;">  <p><b>Collecting</b> Age 3 to 5</p> <p>In this task, children make a collection out of some items and then discuss what they notice about their collection, focusing on the shapes and patterns that they can make.</p> </div> </div>		<a href="https://nrich.maths.org/2784">https://nrich.maths.org/2784</a>
<p><b>EYFS Patterns Resources</b></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Repeating Pattern Interactive Bead String for KS1 Worksheet ★★★★★ - 4.9 (10 reviews)</p> </div> <div style="text-align: center;">  <p>Pretty Patterns Song PowerPoint ★★★★★ - 4.8 (8 reviews)</p> </div> <div style="text-align: center;">  <p>Curly Caterpillar's Repeating Pattern PowerPoint ★★★★★ - 4.8 (23 reviews)</p> </div> </div>		<a href="https://www.twinkl.co.uk/resources/early-years-mathematics/early-years-shape-spaces-and-measures/early-years-pattern">https://www.twinkl.co.uk/resources/early-years-mathematics/early-years-shape-spaces-and-measures/early-years-pattern</a>

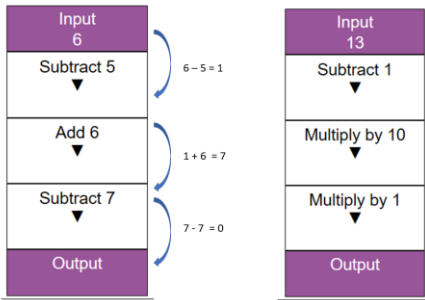
# KS1

Key Skills and Strategy Development KS1	Question stems																
Spot the pattern/rule and describe it mathematically.	Is this a repeating pattern? Is this a step size, following a rule? Can you describe it mathematically?																
Design a process or arithmetic strategy using the rules	What arithmetic knowledge will you use?																
Prove mathematically	What will the proof look like?																
Example problems	Model answers	Links															
	<p>Repeating colours and shapes – blue circle, red triangle, blue circle, red triangle etc..</p> <p>Repeating colours and quantities</p> <p>Increases/decreasing in equal step sizes e.g +1</p>																
<p><b>3</b> Complete the missing numbers.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>25</td> <td>30</td> <td>35</td> <td></td> <td></td> </tr> <tr> <td>50</td> <td>40</td> <td></td> <td>20</td> <td></td> </tr> <tr> <td></td> <td>4</td> <td>6</td> <td>8</td> <td></td> </tr> </table>	25	30	35			50	40		20			4	6	8		<p>Counting in:</p> <p>5s 10s 2s</p>	SATS paper
25	30	35															
50	40		20														
	4	6	8														
<p><b>28</b> Kemi makes a pattern with sticks. Some are long and some are short.</p> <p>She writes a number pattern on the sticks.</p>  <p>Write the number that will be on the next <b>short</b> stick.</p> <div style="border: 1px solid blue; width: 40px; height: 20px; margin-left: auto; margin-right: auto;"></div>	55	SATS paper															
<p><b>5</b> Kim is counting in 2s. She starts counting at 32</p> <p style="text-align: center;">32 ...</p> <p>Circle the numbers that Kim will say.</p> <p style="text-align: center;">45   36   44</p>	<p>Even numbers</p> <p>36 44</p>	SATS paper															

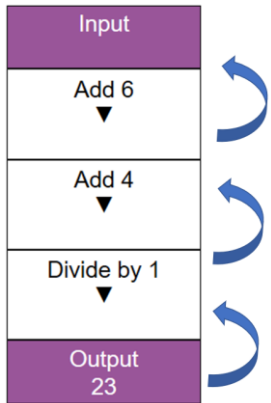


## Lower KS2

Key Skills and Strategy Development LKS2	Question stems																
Spot the pattern/rule and describe it mathematically.	Is this a repeating pattern? Is this a step size, following a rule? Is it increasing or decreasing? Can you describe it mathematically?																
Design a process or arithmetic strategy using the rules	What arithmetic knowledge will you use? What inverse relationships will you use?																
Prove mathematically	What will the proof look like? Are there other examples that satisfy the rule?																
Example problems	Model answers	Links															
Three consecutive whole numbers will always equal a multiple of three.	3, 4, 5 = 12    yes 42, 43, 44 = 129    yes																
"If you count in steps of 4 you will always say a multiple of 4."	Sometimes depending on what you start with	White Rose Year 3															
<div style="border: 1px solid black; padding: 5px;"> <p><b>1</b> The numbers in this sequence increase by 14 each time.</p> <p>Write the missing numbers.</p> <p><input type="text"/> 82 96 <input type="text"/> 124 138 <input type="text"/> <span style="float: right;">2 marks</span></p> </div>	68    110    152	KS2 SATS paper															
<div style="border: 1px solid black; padding: 5px;"> <p><b>1</b> Write the next two numbers in each sequence.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 10px;">6</td> <td style="border: 1px solid black; padding: 2px 10px;">12</td> <td style="border: 1px solid black; padding: 2px 10px;">18</td> <td style="border: 1px solid black; padding: 2px 10px; width: 20px;"></td> <td style="border: 1px solid black; padding: 2px 10px; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 2px 10px;">21</td> <td style="border: 1px solid black; padding: 2px 10px;">28</td> <td style="border: 1px solid black; padding: 2px 10px;">35</td> <td style="border: 1px solid black; padding: 2px 10px;"></td> <td style="border: 1px solid black; padding: 2px 10px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 2px 10px;">90</td> <td style="border: 1px solid black; padding: 2px 10px;">81</td> <td style="border: 1px solid black; padding: 2px 10px;">72</td> <td style="border: 1px solid black; padding: 2px 10px;"></td> <td style="border: 1px solid black; padding: 2px 10px;"></td> </tr> </table> </div>	6	12	18			21	28	35			90	81	72			24 30 42 49 63 54	KS2 SATS paper
6	12	18															
21	28	35															
90	81	72															
<div style="border: 1px solid black; padding: 5px;"> <p><b>1</b> Complete the sequences.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 10px;">2,000</td> <td style="border: 1px solid black; padding: 2px 10px;">3,000</td> <td style="border: 1px solid black; padding: 2px 10px; width: 50px;"></td> <td style="border: 1px solid black; padding: 2px 10px;">5,000</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px 10px; width: 50px;"></td> <td style="border: 1px solid black; padding: 2px 10px;">5,400</td> <td style="border: 1px solid black; padding: 2px 10px;">4,400</td> <td style="border: 1px solid black; padding: 2px 10px;">3,400</td> </tr> </table> </div>	2,000	3,000		5,000		5,400	4,400	3,400	4,000  6,400	KS2 SATS paper							
2,000	3,000		5,000														
	5,400	4,400	3,400														



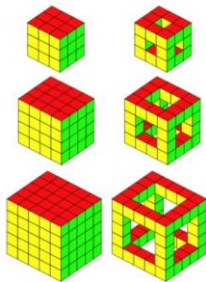
<https://mathsbot.com/tools/functionMachines>



<https://mathsbot.com/tools/functionMachines>

**Holes**

Age 5 to 11  
Challenge Level ★



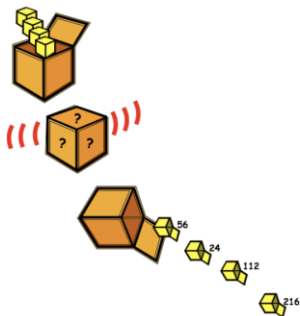
Length of side	No. of cubes in solid	No. of cubes in frame	Difference
3 (+4=7)	27	20	7 (1 <sup>st</sup> multiple of 7)
4 (+4=8)	64	32	32 (4 <sup>th</sup> multiple of 8)
5 (+4=9)	125	44	81 (9 <sup>th</sup> multiple of 9)
6 (+4=10)	216	56	160 (16 <sup>th</sup> multiple of 10)
7 (+4=11)	343	68	275 (25 <sup>th</sup> multiple of 11)

<https://nrich.maths.org/652>  
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**What's in the Box?**

Age 7 to 11  
Challenge Level ★

Four numbers in little boxes are put into a special big box that does a multiplication, then four new numbers come out at the end:

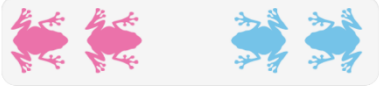
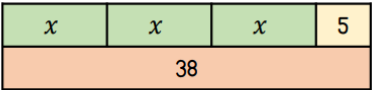
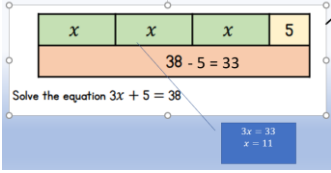
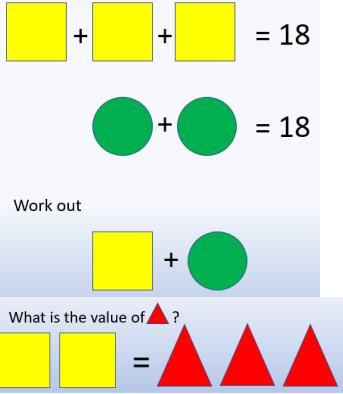
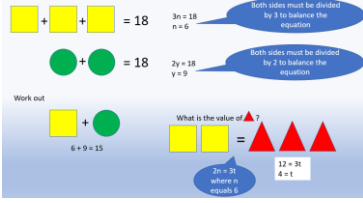
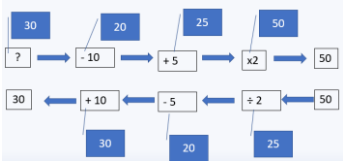
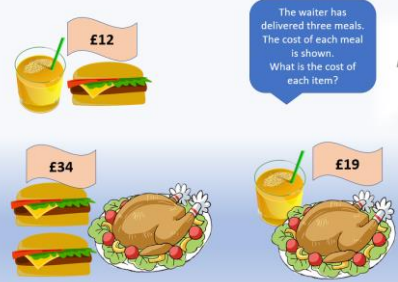
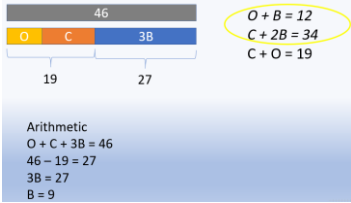



X 2  
X 4

<https://nrich.maths.org/557>  
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## Upper KS2

Key Skills and Strategy Development UKS2	Question stems															
Spot the pattern/rule and describe it mathematically.	What is the rule in the sequence? Is it increasing or decreasing in regular step sizes? Can you describe it mathematically?															
Design a process or arithmetic strategy using the rules	What arithmetic knowledge will you use? What inverse relationships will you use?															
Prove mathematically	What will the proof look like? Are there other examples that satisfy the rule? Is there an expression for the rule? The nth term?															
Example problems	Model answers	Links														
<p>14 Fill in the missing numbers.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>3</td> <td>7</td> <td>12</td> <td>18</td> <td>25</td> <td></td> <td></td> </tr> <tr> <td>0.5</td> <td></td> <td>1.3</td> <td>1.7</td> <td></td> <td></td> <td></td> </tr> </table>	3	7	12	18	25			0.5		1.3	1.7				<p>+4</p> <p>+ 0.4</p> <p>- 0.4</p>	KS2 SATS paper
3	7	12	18	25												
0.5		1.3	1.7													
<p>23 Here is a pattern of number pairs.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>a</th> <th>b</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>9</td> </tr> <tr> <td>2</td> <td>19</td> </tr> <tr> <td>3</td> <td>29</td> </tr> <tr> <td>4</td> <td>39</td> </tr> </tbody> </table> <p>Complete the rule for the number pattern.</p> <p style="text-align: center;"><math>b = \square \times a - \square</math></p>	a	b	1	9	2	19	3	29	4	39	<p><math>B = 10 \times a - 1</math></p>	KS2 SATS paper				
a	b															
1	9															
2	19															
3	29															
4	39															
<p>21 The numbers in this sequence increase by the same amount each time.</p> <p>Write the missing numbers.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>1</td> <td><math>1\frac{5}{8}</math></td> <td><math>2\frac{1}{4}</math></td> <td></td> </tr> </table>		1	$1\frac{5}{8}$	$2\frac{1}{4}$		<p>+ 5/8    - 5/8</p>	KS2 SATS paper									
	1	$1\frac{5}{8}$	$2\frac{1}{4}$													
<p>17 <math>x + 2y = 20</math></p> <p>x and y are whole numbers less than 10</p> <p>What could x and y be?</p> <p style="text-align: right;">x = <input style="width: 50px;" type="text"/></p> <p style="text-align: right;">y = <input style="width: 50px;" type="text"/></p>	<p>X = 2    y = 9</p> <p>X = 4    y = 8</p> <p>X = 6    y = 7</p> <p>X = 8    y = 6</p>	KS2 SATS paper														
<p>8 Jack chose a number.</p> <p>He multiplied the number by 7</p> <p>Then he added 85</p> <p>His answer was 953</p> <p>What number did Jack choose?</p> <p>Show your method</p> <div style="border: 1px solid black; width: 150px; height: 100px; margin-left: 20px; position: relative;"> <div style="position: absolute; bottom: 5px; right: 5px; border: 1px solid black; width: 40px; height: 20px;"></div> </div>	<p>Inverse</p> <p><math>953 - 85 = 868</math></p> <p><math>868 \div 7 = 124</math></p>	KS2 SATS paper														

<p><b>Frogs NRICH 1246</b></p> <p>Find a way to swap the 2 red and 2 blue frogs.</p>  <p>You have made 0 moves.</p> <p>Reset Replay</p>		<p><a href="https://nrich.maths.org/628">https://nrich.maths.org/628</a> 2</p>
 <p>Solve the equation <math>3x + 5 = 38</math></p>	 <p>Solve the equation <math>3x + 5 = 38</math></p> <p><math>3x = 33</math> <math>x = 11</math></p>	<p>Kate Burton</p>
 <p>Work out</p> <p>What is the value of <math>\triangle</math>?</p>	 <p>Both sides must be divided by 3 to balance the equation. <math>3n = 18</math> <math>n = 6</math></p> <p>Both sides must be divided by 2 to balance the equation. <math>2y = 18</math> <math>y = 9</math></p> <p>Work out</p> <p><math>6 + 9 = 15</math></p> <p>What is the value of <math>\triangle</math>?</p> <p><math>2n = 24</math> where <math>n</math> equals 6 <math>12 = 36</math> <math>4 = 1</math></p>	<p>Kate Burton</p>
<p>I think of a number. I subtract 10 and add 5. I then double it. My answer is 50, what was my number?</p>		<p>Kate Burton</p>
 <p>The waiter has delivered three meals. The cost of each meal is shown. What is the cost of each item?</p>	 <p>Arithmetic</p> <p><math>O + C + 3B = 46</math> <math>46 - 19 = 27</math> <math>3B = 27</math> <math>B = 9</math></p>	<p>Kate Burton</p>
<p><b>Problem 20</b> Numbers 12.1</p> <p>Arnold baked cupcakes over the weekend. Each day during the week he took three cakes to school to share with his friends. On Saturday when he counted there were 18 left. How many had he baked?</p> 	<p>Inverse</p> <p><math>18 - 3 = \text{etc}</math></p>	<p>Badger Maths (Y6)</p> <p>Other Badger Maths problem for patterns and rules:</p> <p>Problem: Working backwards problems</p>