

HOME LEARNING

Year 9

Home Learning 2

Focus for this week: Number patterns

Essential learning:	<ul style="list-style-type: none">Write numbers onto a number line, including negative numbers
Practising:	<ul style="list-style-type: none">Continue number patterns, including negative numbersUse a flow diagram/number machine to make a pattern
Learning about:	<ul style="list-style-type: none">Generate a sequence from an algebraic expression (e.g. $2n+3$)
Extension:	<ul style="list-style-type: none">Find the nth term of a sequence (e.g. turn 4, 6, 8, 10.... into $2n+3$)Recognise and continue geometric and quadratic sequences

Tasks:

- Complete at least two worksheets
- Login to MyMaths and complete MyMaths tasks
- Spend 10 minutes a day on Times Table Rock Stars; Numbots OR Sumdog
- Please email a photo of any worksheets or poster you complete to the email address below.
This will earn you a golden token.

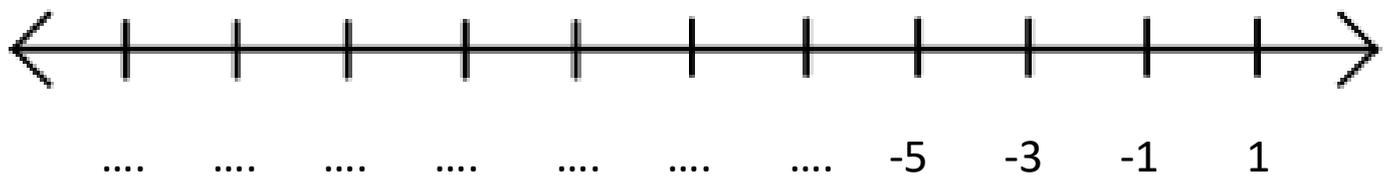
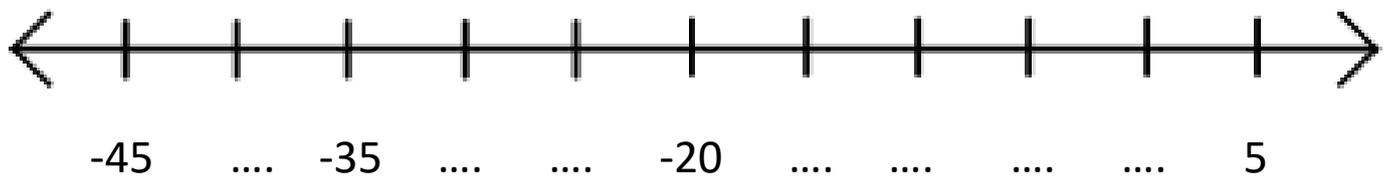
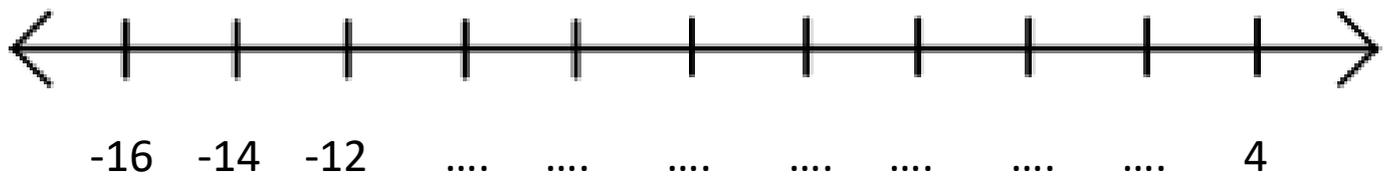
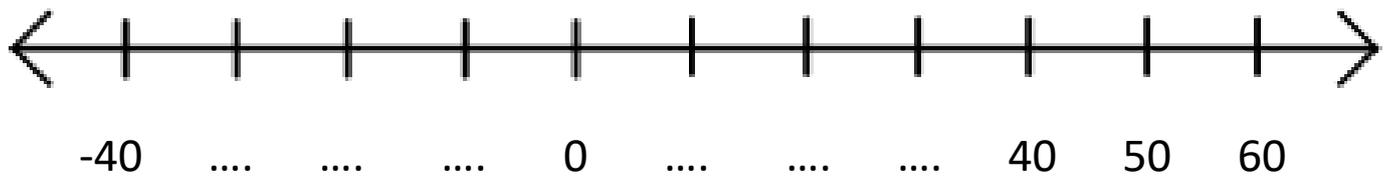
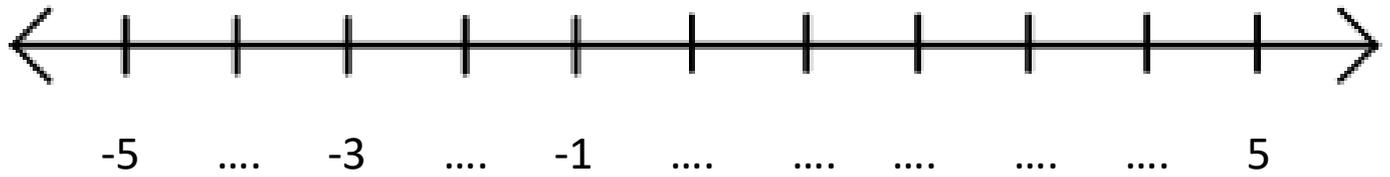
Additional activities:

- More info on number patterns: <https://www.bbc.co.uk/bitesize/topics/znj7hyc/articles/zkwpkg8>
- The year 8 work for this week contains practise with multiples – have a look at this
- Play Yahtzee
- Look for number patterns in Monopoly (e.g. rent for each property going around the board)
- Practise saying your times tables (e.g. every-time you walk up some stairs)
- Play 'Countdown' (e.g. <https://nrich.maths.org/6499>) on your own or with someone else
- Complete SAM learning Maths tasks
- More Challenge:** Do Diagnostic questions or Mangahigh tasks for more challenge (*email Mr.Croft for more info*)
- Much More challenge:** https://www.cimt.org.uk/projects/mepres/book9/bk9_10.pdf (complete the exercises instead of the worksheets)

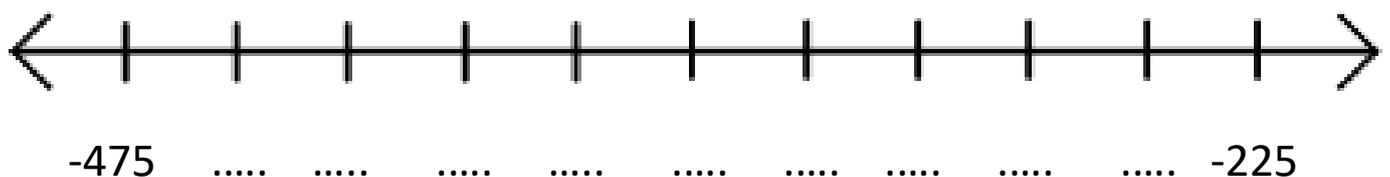
If you have queries about this work, please contact me at acroft@bower-grove.kent.sch.uk

Yr9 Maths w/b 20/4/20: Worksheet 1 Number lines with negative numbers

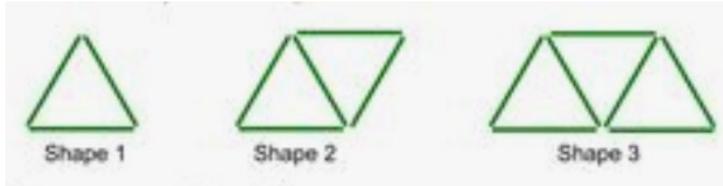
1. Watch this video: <https://www.bbc.co.uk/bitesize/topics/znwj6sg/articles/zxthnbk>
2. Continue the number patterns on the number-lines below:



Challenge:

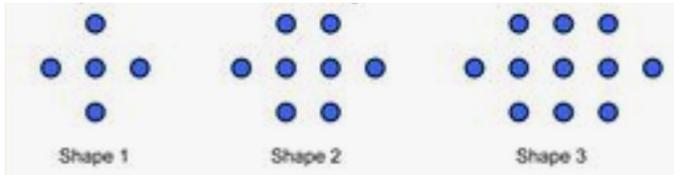


Task A: Draw the next two shapes for each pattern



Shape 4

Shape 5



Shape 4

Shape 5

Task B: Complete the table relating to each shape. Then write the rule below (e.g. +2; -4; +3; -6; +5, etc.)

Triangle shapes

Shape	Sticks
1	3
2	5
3	
4	
5	
6	
7	
Rule	

Cross shapes

Shape	Counters
1	5
2	8
3	
4	
5	
6	
7	
Rule	

Task C: Continue the number patterns and find the rule. Extension. Work out the 10th 50th and the 100th number.

1 st number	3 rd number	4 th number	5 th number	6 th number	7 th number	8 th number	9 th number
3	6	9					
Rule:		Ext: 10 th number: ____		Ext: 50 th number: ____		Ext: 100 th number: ____	

1 st number	3 rd number	4 th number	5 th number	6 th number	7 th number	8 th number	9 th number
4	7	10					
Rule:		Ext: 10 th number: ____		Ext: 50 th number: ____		Ext: 100 th number: ____	

1 st number	3 rd number	4 th number	5 th number	6 th number	7 th number	8 th number	9 th number
20	17	14					
Rule:		Ext: 10 th number: ____		Ext: 50 th number: ____		Ext: 100 th number: ____	

Example 1:

Each number in a number pattern is called a *term*. The first number is called the 1st term, this is followed by the 2nd term, then 3rd term, etc...

The first five terms of the number pattern $3n$ are 3, 6, 9, 12, 15 Notice something about these?

You're right! $3n$ is another way of describing the three times-table!

What do you think $4n$ would be?

Let's write it out:

1 st term	2 nd term	3 rd term	4 th term	5 th term
$4 \times 1 = 4$	$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$	$4 \times 5 = 20$

The first five terms of the number pattern $4n$ are 4, 8, 12, 16, 20. It's the 4 times table!

Task A: Write out the first five terms for each of these:

2n: _____; _____; _____; _____; _____;

5n: _____; _____; _____; _____; _____;

10n: _____; _____; _____; _____; _____;

11n: _____; _____; _____; _____; _____;

Example 2:

Sequences (number patterns) can have two steps: $3n + 1$. We can use a flow diagram to work out each term.

$3n + 1$:



So the first four terms of $3n + 1$ are 4, 7, 10 and 13. We can work out that the rule is $+3$. The fifth term must be 16.

Task B: Write out the first five terms from each algebraic expression.

Example: $4n-1$

Term	1 st	2 nd	3 rd	4 th	5 th
Calculation	$4 \times 1 - 1$	$4 \times 2 - 1$	$4 \times 3 - 1$	$4 \times 4 - 1$	$4 \times 5 - 1$
Answer	3	7	11	15	19

a) $2n+3$ _____; _____; _____; _____; _____;

b) $3n-1$ _____; _____; _____; _____; _____;

c) $5n-1$ _____; _____; _____; _____; _____;

d) $10n-1$ _____; _____; _____; _____; _____;

e) $6n + 2$ _____; _____; _____; _____; _____;

Extension: Make up your own expressions and write out each number pattern.

Task A Explain in one sentence, how you know that the first five terms of $3n - 1$ are: 2, 5, 8, 11 and 14

Task B

Work out the rule for each of these sequences, and write it in the box. *The first one is done for you.*

<p>Rule = +3</p> <div style="border: 1px solid black; background-color: #4a86e8; color: white; padding: 5px; margin: 5px; text-align: center; font-size: 24px;"> $3n+1$ </div> <div style="border: 1px solid black; background-color: #4a86e8; height: 40px; margin: 5px;"></div>	<p>Rule = +2</p> <div style="border: 1px solid black; background-color: #4a86e8; height: 40px; margin: 5px;"></div> <div style="border: 1px solid black; background-color: #4a86e8; height: 40px; margin: 5px;"></div>	<p>Rule = +1</p> <div style="border: 1px solid black; background-color: #4a86e8; height: 40px; margin: 5px;"></div> <div style="border: 1px solid black; background-color: #4a86e8; height: 40px; margin: 5px;"></div>
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- | | |
|-------------------------------------------|---------------------------------------|
| a) $3n+1$: (4, 7, 10, 13, 16). Rule = +3 | b) $n+5$: (6, 7, 8, 9, 10). Rule = |
| c) $2n+3$: (5, 7, 9, 11, 13). Rule = | d) $n+1$: (2, 3, 4, 5, 6). Rule = |
| e) $3n+2$: (5, 8, 11, 14, 17). Rule = | f) $2n+2$: (4, 6, 8, 10, 12). Rule = |

Teaching point: You will hopefully notice that the number next to the n for each expressions tells us the rule. For example the expression $4n - 1$ has the first five terms: 3, 7, 11, 15, 19. The **4** next to the n tells us that the rule is +4.

Task C: What is the number pattern (sequence) rule for each of these expressions (the first three are examples):

- | | | | | | |
|--------------|-----------------|--------------|-----------------|--------------|-----------------|
| a) $7n + 2$ | Rule= <u>+7</u> | b) $2 + 4n$ | Rule= <u>+4</u> | c) $2 - 3n$ | Rule= <u>-3</u> |
| d) $3n + 2$ | Rule= _____ | e) $2 + 5n$ | Rule= _____ | f) $7 - 4n$ | Rule= _____ |
| g) $17n + 2$ | Rule= _____ | h) $17 + 3n$ | Rule= _____ | i) $-7n + 2$ | Rule= _____ |
| j) $2 - 6n$ | Rule= _____ | k) $5n + 4$ | Rule= _____ | l) $-9n + 2$ | Rule= _____ |

Task D: Give me three examples of expressions where the rule for the number pattern is +5

Task E: Give me three examples of expressions where the rule for the number pattern is -3

Task F: Well done for getting this far. Some tricky work today. Last task!

The table shows a rule and two different number patterns for each rule. Complete the table as best as you can.

Number Pattern 1	Rule for number pattern 1 and number pattern 2	Algebraic expression	Number pattern 2 (same rule as number pattern 1)	Extension: Find the algebraic expression for number pattern 2
3, 6, 9, 12, 15	+3	$3n$	4, 7, 10, 13, 16	$3n+1$
2, 4, 6, 8, 10		$2n$	3, 5, 7, 9, 11	
4, 8, 12, 16, 20			3, 7, 11, 15, 19	
5, 10, 15, 20, 25			8, 13, 18, 23, 28	
10, 20, 30, 40, 50			12, 22, 32, 42, 52	
6, 12, 18, 24, 30			5, 11, 17, 23, 29	

Please email completed worksheets to me at acroft@bower-grove.kent.sch.uk. Good attempts earn a golden token.