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0607/52

May/June 2017

1 hour

Additional Materials: Graphics Calculator

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

The total number of marks for this paper is 24.

This document consists of 7 printed pages and 1 blank page.

Answer **all** the questions.

INVESTIGATION

NUMBER STEMS

This investigation is about finding numbers that have the same *Number Stem*.

The possible *Number Stems* are the nine integers from 1 to 9.

Here is how to calculate the *Number Stem* of a number.

- Step 1 Add the digits of the number to get a total.
 Step 2 If the total is 9 or less, STOP.
 Otherwise, add the digits of the total.
 Step 3 Repeat Step 2.

Examples

Number	124	Number	893
Step 1	$1 + 2 + 4 = 7$	Step 1	$8 + 9 + 3 = 20$
Step 2	STOP	Step 2	$2 + 0 = 2$
<i>Number Stem</i> is 7.		Step 3	STOP
		<i>Number Stem</i> is 2.	

- 1 (a) Complete the tables to show the *Number Stems* for these multiples of 3, 12, 21 and 30.

Multiple of 3	3	6	9	12	15	18	21	24	27	30
<i>Number Stem</i>	3	6	9	3		9	3	6	9	3

Multiple of 12	12	24	36	48	60	72	84	96	108	120
<i>Number Stem</i>	3	6	9			9			9	3

Multiple of 21	21	42	63	84	105	126	147	168	189	210
<i>Number Stem</i>	3					9	3	6	9	3

Multiple of 30	30	60	90	120	150	180	210	240	270	300
<i>Number Stem</i>	3					9	3	6	9	3

(b) Complete this statement.

The numbers in the table that have a *Number Stem* of 9 are all of 9.

(c) Complete this table.

3	÷	9	=	0	remainder	3
12	÷	9	=	1	remainder	3
21	÷		=	2	remainder	3
.....	÷	9	=	3	remainder	3
39	÷	9	=		remainder	

(d) Complete the statement.

A number that has a of 3 when divided by 9 has a *Number Stem* of

- (e) The only one-digit number with a *Number Stem* of 3 is 3.
This sequence shows the first four numbers **greater than 3** with a *Number Stem* of 3.

12, 21, 30, 39, ...

- (i) Write down the rule for continuing this sequence.

.....

- (ii) Find the n th term of this sequence.

.....

- (iii) Find the 87th number **greater than 3** that has a *Number Stem* of 3.

.....

- 2 (a) Complete the tables to show the *Number Stems* for different multiples of 2 and 11.

Multiple of 2	2	4	6	8	10	12	14	16	18	20	22	24
<i>Number Stem</i>	2	4	6	8						2	4	6

Multiple of 11	11	22	33	44	55	66	77	88	99			
<i>Number Stem</i>	2	4	6	8						2	4	6

- (b) The sequence shows the first three numbers **greater than 2** with a *Number Stem* of 2.

11, 20, 29, ...

- (i) Write down the next two numbers of the sequence.

..... ,

- (ii) Find the n th term of this sequence.

.....

- (iii) Show that 1352 is the 150th number **greater than 2** that has a *Number Stem* of 2.

- 3 (a) Write down the first four numbers **greater than 8** with a *Number Stem* of 8.

..... , , ,

- (b) Find the n th term of this sequence.

.....

- (c) Using your answer to **part (b)**, find the number closest to 10 000 that has a *Number Stem* of 8.

.....

4 The integer k is a *Number Stem*.

- (a) Write down, in terms of k , expressions for the first four numbers **greater than k** with a *Number Stem* of k .

..... , , ,

- (b) Write down, in terms of n and k , the n th term for the sequence of numbers **greater than k** with a *Number Stem* of k .

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