Recognising Patterns using the 100 Grid

Tom Penlington

RUMEP, Rhodes University

t.penlington@ru.ac.za

INTRODUCTION

Exploring patterns is the essence of mathematics. However, learners in the Intermediate Phase often find it challenging to describe patterns. The 100 grid is a useful and versatile tool that can be used in Foundation and Intermediate Phase classrooms to teach and consolidate a number of mathematical concepts while engaging with the notion of pattern.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	18	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

I recently explored a number of activities related to the 100 grid with a group of teachers in the context of a teacher development programme. I then went on to carry out the various activities with a group of learners to see how well they played out in the classroom. I was quite taken by how excited and engaged the learners became as they worked through the activities and questions.

In this article I share the various activities which introduce learners to new mathematical words as they look for patterns and describe relationships between numbers. The 100 grid is used as the basis for the various activities.

ACTIVITY 1

Vocabulary: even numbers, odd numbers, division, multiplication, product, factors

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	18	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Use a 100 grid and shade all the even numbers on the grid.
2. Do you notice any patterns? How many vertical stripes do you see?
3. How many shaded squares are there in each row?
4. How many even numbers are there from 1 to 100?
5. How many twos are there in 100?
6. How many twos are there in 200?
7. What are seven twos?
8. What is the twelfth even number?
9. What would the 55^{th} even number be?
10. What do we call a number that will divide an equal number of times into another number?
11. What are the factors of 10?
12. What are the factors of 24?
13. What are the factors of 64?
14. Shade in all the odd numbers. What do you notice?
15. Odd numbers do not contain an exact number of twos but always have one over.
16. In 16 there are _____ twos.
17. In 17 there are _____ twos and _____ over or remaining.
18. What is 25 ÷ 2? Try (____ x 2) + 1 = 25.

ACTIVITY 2

Vocabulary: multiple, pattern, digit sum

Use another 100 grid and shade number 3. Miss the next two and shade 6. Miss two more and shade the next one. Miss 10 and 11 and shade the next one. Continue until you complete the pattern up to 100.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	18	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. How many squares have been shaded?
2. What patterns do you notice?
3. How many threes are there in 99?
4. How many threes are there in 100?
5. What are twelve threes?
6. What is the thirty-fourth number in the pattern of threes?
7. All shaded numbers are _____ of three.
8. What is the sum of the two digits of the number 12?
9. What is the digit sum of the number 15 and the number 18? What do you notice?
10. Are all the patterns of 3 (or multiples of 3) odd?

ACTIVITY 3

Vocabulary: multiples, rows, columns, between

Use another 100 grid and shade number 4. Miss the next three numbers and shade number 8. Carry on in the same way until you reach 100. The shaded numbers are called multiples of 4.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	18	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Do you notice any patterns?
2. How many squares are shaded in the first two rows?
3. How many fours are there in 20?
4. How many squares are shaded from 21 to 40?
5. How many fours are there in 40?
6. What are twelve fours?
7. How many fours are there in 100?
8. What is the next number after 100 which can be divided by 4?
9. What is the 45^{th} number in the pattern of fours?
10. Are all the numbers in the pattern of 4 able to be divided by four?
11. Can all numbers that can be divided by 4 also be divided by 2?
12. What number(s) below 100 can be divided by 3 and 4?
13. Can all numbers that can be divided by 2 also be divided by 4?
14. How many odd numbers are in the pattern?
15. Will any odd number be able to be divided by 4? Try to explain your answer.
16. Does an even number which cannot be divided by 4 always leave a remainder of 2?
17. Is 24 the lowest number which can be divided by 3 and 4?
18. When you divide an odd number by 4, is the remainder always 3?

ACTIVITY 4

Vocabulary: multiples of 8, product, bigger than, smaller than, divisible, digit

1. Use another 100 grid and shade in all the multiples of 8 (eight times table), starting at 8.
2. Do you notice any patterns?
3. How many multiples of 8 have you shaded?
4. What is the 50^{th} number in the pattern?
5. How many eights are there in 96?
6. How many eights are there in 100?
7. How many eights are there in 64?
8. Which odd numbers are shaded?
9. What are 4 eights?
10. Which numbers bigger than 16 but smaller than 24 would give a remainder when divided by 8?
11. Which numbers are divisible by 8 and also by 3?
12. What do you notice about the last digit in each number?
13. Write down the next four products of 8 after the number 96.
14. What would the final digit of each of those numbers after 96 be?
15. Make a list of the final digits of the products in the pattern of 2, pattern of 4 and pattern of 8. Make a note of any patterns you see.
16. Will 18 be divisible by 2, 4 and 8?
17. Will 56 be divisible by 2, 4 and 8?
18. Will 94 be divisible by 2, 4 and 8?
19. Will 126 be divisible by 2, 4 and 8?
20. Will 2336 be divisible by 2, 4 and 8?

    Note:

    To test if a number is divisible by 4, we must see if the **last two digits** are divisible by 4.

    To test if a number is divisible by 8, we must see if the **last three digits** are divisible by 8.

CONCLUDING COMMENTS

In order to develop in our learners the ability to recognize and describe number patterns, we need to allow them to explore and discuss appropriate numerical contexts, and to look for mathematical relationships as they play with numbers. The 100 grid is a useful and versatile tool for doing just this. The activities described in this article can be extended and adapted to other multiples as well.