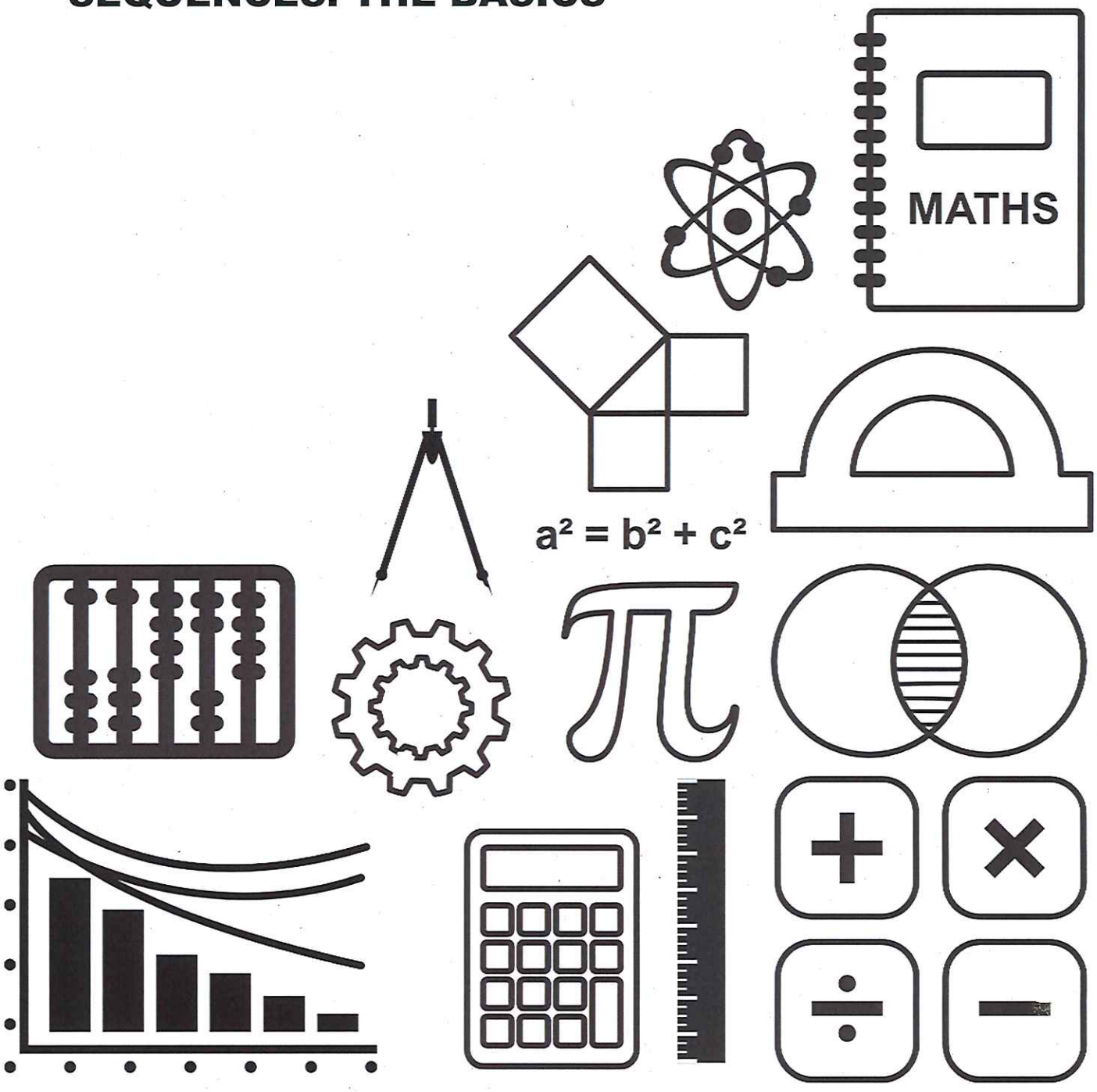
MATHSDIY

SOLUTIONS

GCSE TOPIC BOOKLET
SEQUENCES: THE BASICS



1. Describe **in words** the rule for continuing **each** of the following sequences.

(i) 24, 20, 16, 12, ..., ...

-4 -4 -4

subtract 4 each time

(ii) 3, 9, 27, 81, ..., ...

×3 ×3 ×3

multiply by three each time

[2]

2. Write down the next term of **each** of the following sequences. [2]

(i) 4, 9, 14, 19, 24

+5 +5 +5

(ii) 23, 20, 17, 14, 11

-3 -3 -3

3. Write down the next term in **each** of the following sequences.

(i) 4, 11, 18, 25, 32

+7 +7 +7

(ii) 90, 84, 78, 72, 66

-6 -6 -6

[2]

4. A sequence starts with 8.
Equal amounts are added each time to get the next term.
Write down the three missing terms of the sequence. [3]

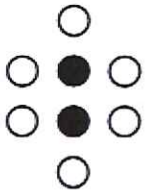
+4·5 +4·5 +4·5 +4·5

8	12·5	17	21·5	26

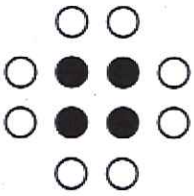
4 'jumps' is + 18

1 jump is $18 \div 4 = 4.5$

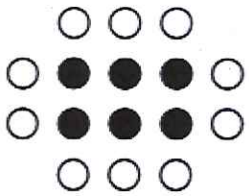
5. The following patterns have been made using black and white discs.



Pattern 1

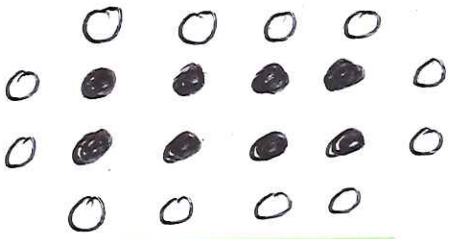


Pattern 2



Pattern 3

(a) Draw Pattern 4 in the space below.



Pattern 4

[1]

(b) Complete the following table.

Pattern number	1	2	3	4	5
Number of black discs	2	4	6	8	10
Number of white discs	6	8	10	12	14

[2]

(c) (i) Without drawing it, write down the number of the pattern that has 16 black discs.

pattern 6 7 8

black 12 14 16 Pattern 8

(ii) Write down the number of white discs in the pattern that has 16 black discs.

pattern 6 7 8

white 16 18 20 20 white discs

[4]

6. Write down the next term in **each** of the following sequences.

(i) 4, +7 11, +7 18, +7 25, 32

(ii) 80, −8 72, −8 64, −8 56, 48

[2]

(b) Describe, **in words**, the rule for continuing **each** of the following sequences.

(i) 9, +6 15, +6 21, +6 27,

Rule: Add on six each time

(ii) ÷3 81, ÷3 27, ÷3 9, 3,

Rule: Divide by three each time

[2]

7. *(a)* Write down the next term in **each** of the following sequences. [2]

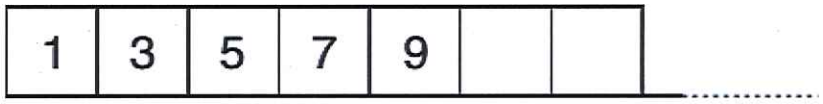
(i) 15, +6 21, +6 27, +6 33, 39

(ii) 62, −6 56, −5 51, −4 47, −3 44

(b) Describe, in words, the rule for continuing the sequence 48, ÷4 12, ÷4 3, ÷4 $\frac{3}{4}$, ... [1]

Divide by four each time.

8. The houses on one side of a long street have odd numbers and the houses on the other side of the street have even numbers.



(a) Fill in the numbers on these houses.

97 99 101 103 105

98 100 102 104 106

[1]

(b) The numbers on five houses next to each other on one side of the street total 65.
What are the numbers on these five houses?

65 ÷ 5 gives average which is the one in the middle = 13

9 11 13 15 17

[3]

(c) The product of the numbers on two houses which are directly opposite each other is 90.
What are the numbers on these two houses?

9 and 10

[1]

9. Write down the next term in **each** of the following sequences.

(i) 2, 10, 18, 26, ... 34

(ii) 100, 84, 68, 52, ... 36

[2]

10. Write down the next term in **each** of the following sequences.

(i) 6, 10, 14, 18, ... 22

(ii) 100, 91, 82, 73, ... 64

[2]

11. Write down the next term in each of the following sequences.

(i) 16, 22, 28, 34, ... 40

(ii) 90, 82, 74, 66, ... 58

[2]

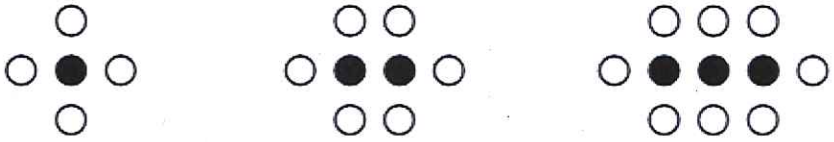
12. Write down the next term in each of the following sequences.

(i) 3, 9, 15, 21, ... 27

(ii) 85, 78, 71, 64, ... 57

[2]

13. The following patterns have been made using black and white discs.



Pattern 1 Pattern 2 Pattern 3

(a) Draw Pattern 4 in the space below.

Pattern 4

[1]

(b) Complete the following table.

Pattern	1	2	3	4	5
Number of black discs	1	2	3	4	5
Number of white discs	4	6	8	10	12

[2]

(c) Without drawing any more patterns, answer the following two questions.

(i) Write down the number of black discs in Pattern 50. 50

.....

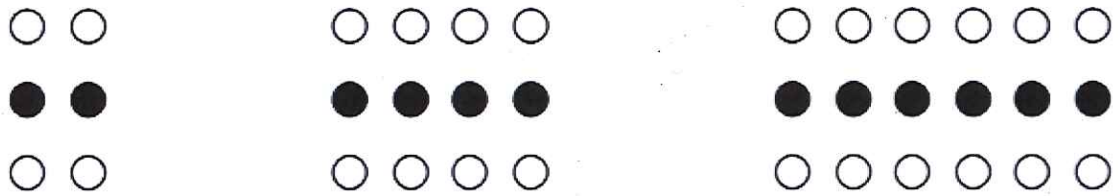
(ii) There are 100 white discs in Pattern 49.
How many white discs are there in Pattern 50? 102

.....

.....

[2]

14. The following patterns have been made using black discs and white discs.



Pattern 1 Pattern 2 Pattern 3

(a) Draw Pattern 4 in the space below.

Pattern 4

[1]

(b) Complete the following table.

Pattern number	1	2	3	4	5
Number of black discs	2	4	6	8	10
Number of white discs	4	8	12	16	20

[2]

(c) Without drawing any more patterns, answer the following two questions.

(i) Write down the number of black discs in Pattern 45.

45 × 2 = 90

(ii) In a certain pattern there are 200 white discs. How many black discs are there in that pattern?

200 ÷ 2 = 100

[2]

15.

(a) Write down the next term in **each** of the following sequences.

(i) 5, 11, 17, 23, ... 29

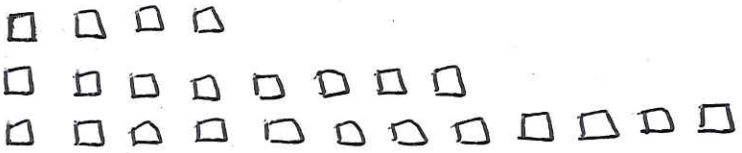
(ii) 56, 49, 42, 35, ... 28

[2]

(b) The symbol □ is used to form a pattern.
The first three patterns are shown below.

Pattern 1	Pattern 2	Pattern 3
□	□□	□□□
□□	□□□□	□□□□□□
□□□	□□□□□□	□□□□□□□□□

(i) Draw a diagram showing the fourth pattern.



Pattern 4

(ii) Without drawing the pattern, calculate the number of □ symbols that would be needed to draw the fifth pattern.

Pattern 1 = 1+2+3

Pattern 2 = 2+4+6

Pattern 3 = 3+6+9

Pattern 4 = 4+8+12 [3]

pattern 5 = 5+10+15 = 30

16. Describe **in words** the rule for continuing **each** of the following sequences.

(i) 57, −6 51, −6 45, −6 39, ...

Rule: Subtract six each time

.....

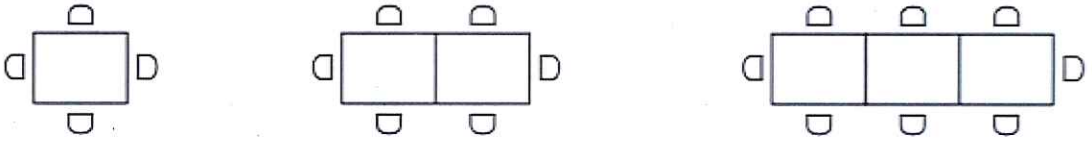
(ii) 1, ×4 4, ×4 16, ×4 64, ...

Rule: Multiply by four each time.

.....

[2]

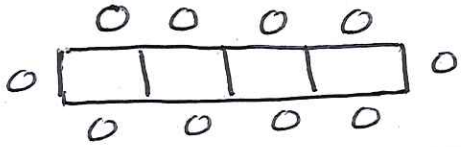
17. Tables are put together and chairs placed around them.



1st diagram 2nd diagram 3rd diagram

In the first diagram there is one table and 4 chairs.

(i) Draw the fourth diagram in the space below.



4th diagram

(ii) How many tables and chairs will there be in the sixth diagram?

.....

.....

There will be 6 tables and 14 chairs.

[4]

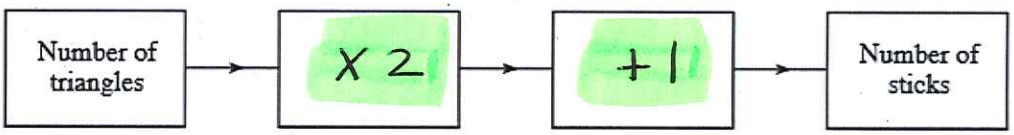
18. Triangle patterns are made using sticks.

(a) Complete the following table which shows the relationship between the number of triangles in a pattern and the number of sticks.

Number of triangles	Number of sticks
1	3
2	5
3	7
4	9
5	11
⋮	⋮
10	21

[1]

(b) Use your table to enter the two missing stages in the number machine which is used to calculate the number of sticks for a given number of triangles.



[2]