

Y7 Mathematics

UNIT 10 Test

Name:

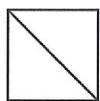
Sequences and Graphs

Mark Scheme

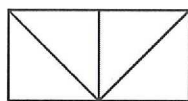
~~42~~

37

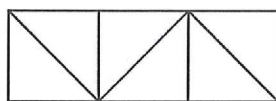
1 Here is a sequence of patterns made from sticks.



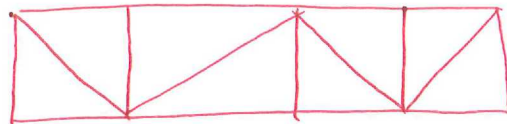
Pattern 1



Pattern 2



Pattern 3



Pattern 4

a Draw pattern number 4 in the space provided.

b Complete the table.

Pattern number	1	2	3	4	5
Total number of sticks	5	9	13	17	20

c Write down the number of sticks in pattern number 50

$$5 + (50 - 1) \times 4$$

$$201$$

d Write an expression, in terms of n for the number of sticks in pattern number n

$$d.f = 4$$

$$4n + 1$$

(5 marks)

2 The first four terms of an arithmetic sequence are

5 8 11 14

a Write down the common difference.

$$8 - 5 =$$

$$3$$

b Write an expression for the n th term of this sequence.

$$3n + 2$$

c Is the number 105 a term of this sequence?

You must give a reason for your answer.

$$3n + 2 = 105$$

$$3n = 103$$

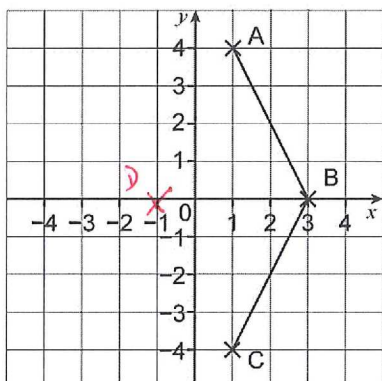
$$n = 103 \div 3$$

$$n = 34 \frac{1}{3} \Rightarrow \text{no}$$

(A1) must have reason

(4 marks)

3 ABCD is a rhombus drawn on a cm grid.



$A = (1, 4)$, $B = (3, 0)$ and $C = (1, -4)$

a Find the coordinates of the point D.

$(-1, 0)$ (A1)

The midpoints of the sides of ABCD are K, L, M and N.

b Find the coordinates of each of these points.

$K = (2, 2)$

$L = (2, -2)$

$M = (0, -2)$

$N = (0, 2)$

any coordinates for any letter

(A3) for all correct

(A2) for one incorrect

(A1) for two incorrect

(4 marks)

4 Find the first three terms given the n^{th} term

a n^{th} term = $6n - 7$

$$n=1 \quad 6 \times 1 - 7 = -1$$

$$n=2 \quad 6 \times 2 - 7 = 5$$

$$n=3 \quad 6 \times 3 - 7 = 11$$

-1, 5, 11 (A1)

b n^{th} term = $n^2 - 2n$

$$n=1 \quad 1^2 - 2 \times 1 = -1$$

$$n=2 \quad 2^2 - 2 \times 2 = 0$$

$$n=3 \quad 3^2 - 2 \times 3 = 3$$

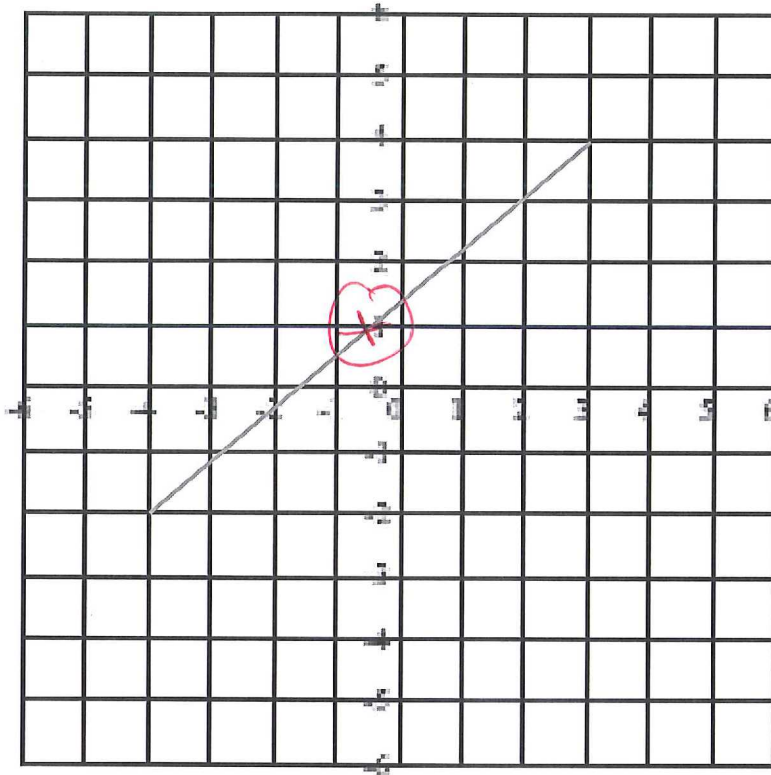
(M1)

-1, 0, 3 (A1)

(3 marks)

5 Find the mid-point of

a the line segment



Redo line

$$\text{midpoint} = \left(-\frac{1}{2}, 1\right)$$

(A1) (A1)

b between with co-ordinates (0,4) and (3,1)

$$\text{mid point} = \left(\frac{0+3}{2}, \frac{4+1}{2}\right) = \left(\frac{3}{2}, \frac{5}{2}\right)$$

(M1) (A1)

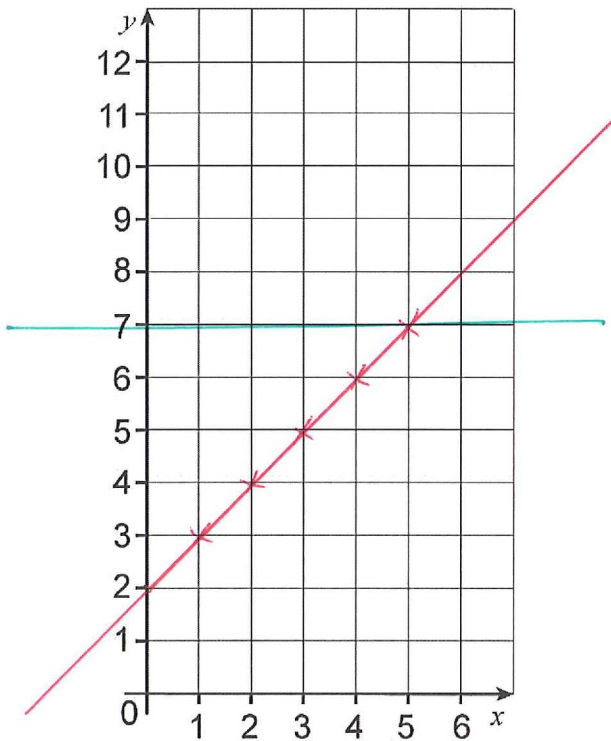
(4 marks)

6 a Complete the table for the graph of $y = x + 2$

x	1	2	3	4	5
y	3	4	5	6	7

(A1)

b On the grid, draw the graph of $y = x + 2$



(A2) for correct
co-ordinates
+ line

(A1) for correct
line using
their incorrect
co-ordinates

The point P lies on the graph $y = x + 2$ and on the graph of $y = 7$

c Find the coordinates of the point P.

(5, 7) (A1)

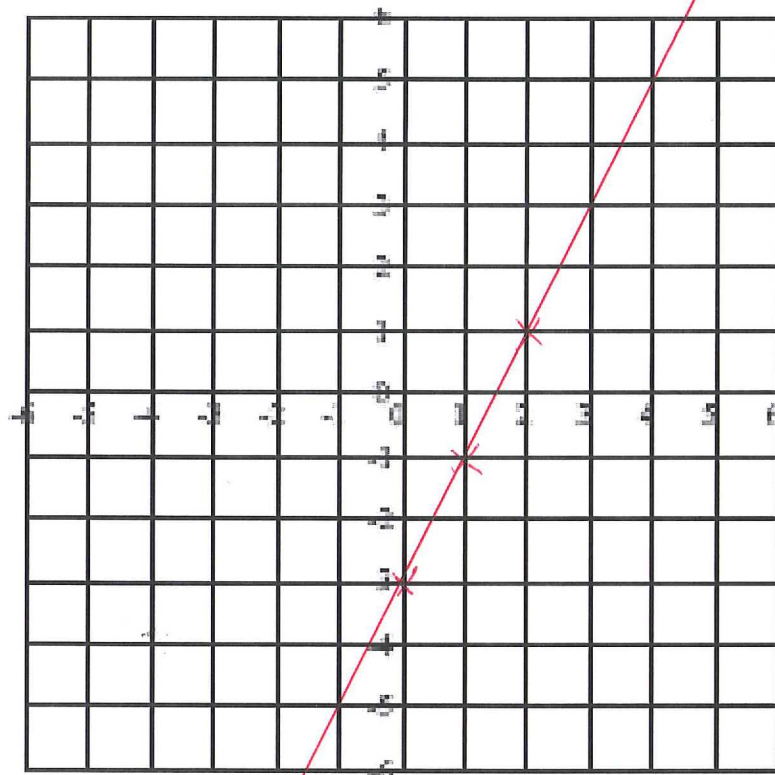
(4 marks)

7 a Complete the table for the graph of $y = 2x - 3$

x	0	1	2
y	-3	-1	1

(A1)

b On the grid, draw the graph of $y = 2x - 3$



(A2) for correct coordinates
+ line

(A1) for correct line using
their incorrect coordinates

.....
(3 marks)

8 Find the n^{th} term of the following sequence

a) 2, 8, 14, 20, 26,

✓✓✓
6 6 6

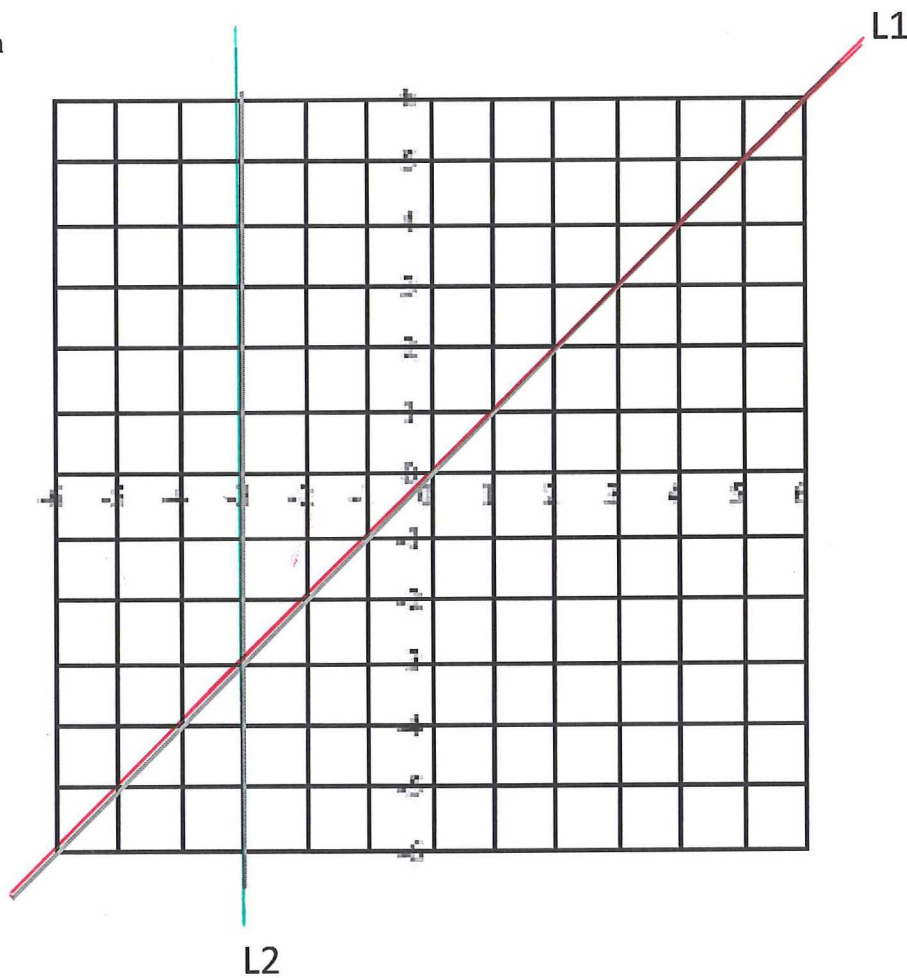
$$n^{\text{th}} \text{ term} = 6n + 2$$

$$\textcircled{A1} \quad 6n - 4 \quad \textcircled{A1}$$

(2 marks)

9 Write the equation of the following lines, L1 and L2

a



Equation of L1:

$$y = x$$

$\textcircled{A1}$

Equation of L2:

$$x = -3$$

$\textcircled{A1}$

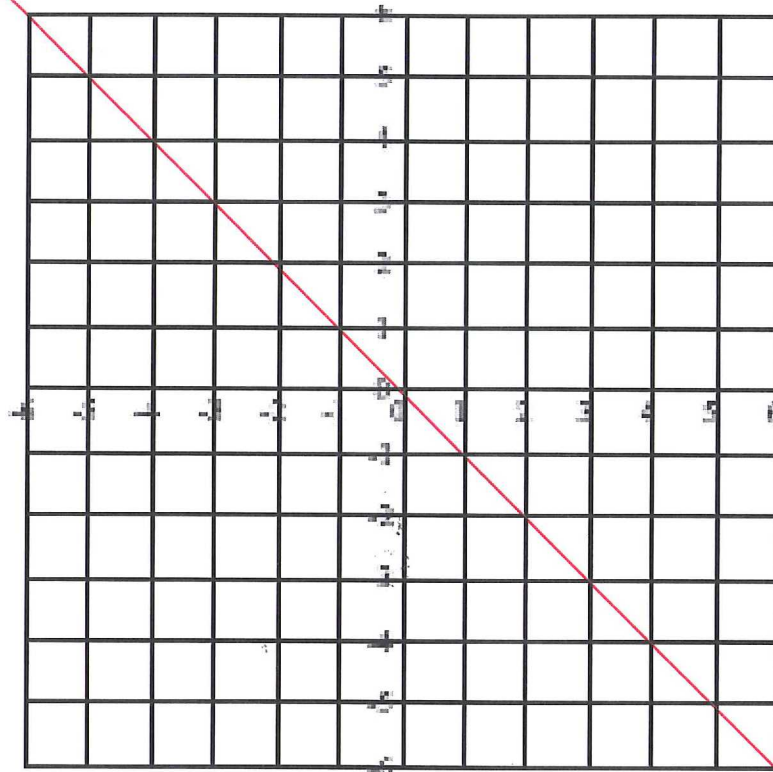
b Complete the table on the next page for the graph of $y = -x$

Print Colour

x	0	1	2
y	0	-1	-2

(A1)

On the grid, draw the graph of $y = -x$



(A1)

.....
(4 marks)

- ~~10~~ The first term of an arithmetic sequence is 8 and the 4th term is -1.
Find the 10th term.

omitted
from
Q paper

$$8, x, y, -1$$
$$\begin{array}{ccc} \checkmark & \checkmark & \checkmark \\ d & d & d \end{array}$$

(M2) for any correct
method

$$8 + 3d = -1$$

$$3d = -9$$

$$d = -3$$

$$10^{\text{th}} \text{ term} = 8 + 9 \times -3 =$$

$$-19$$

(A1)

.....
(3 marks)

- ~~11~~ A sequence has n th term given by $80 - n^2$

How many terms of this sequence are positive numbers?

omitted
from
Q paper

$$80 - n^2 > 0$$

$$80 > n^2$$

$$n < 9$$

(M1) for any logical
reason

or
=

$$80 - 8^2 = 80 - 64 > 0$$

$$81 - 9^2 = 80 - 81 < 0$$

(A1)
8 terms

.....
(2 marks)

now Q10

12 Here are the first 4 terms of a geometric sequence.

2 6 18 54

a Write the next two terms in the sequence.

162, 486

(A1)

b Write, in words, the term-to-term rule for this sequence.

multiply by 3

(A1)

The n th term of this sequence can be written as 2×3^k

c Write the relationship between k and n

$$k = n - 1$$

(A1)

$$1^{\text{st}} \text{ term} = 2 \quad k = 0$$

$$2^{\text{nd}} \text{ term} = 6 = 2 \times 3 \quad k = 1$$

$$3^{\text{rd}} \text{ term} = 18 = 2 \times 3^2 \quad k = 2$$

$$4^{\text{th}} \text{ term} = 54 = 2 \times 3^3 \quad k = 3$$

subtract one

(M1)

Any suitable method

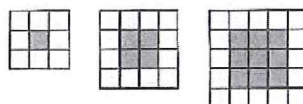
..... (4 marks)

If you have finished, and fully checked your work, try this challenge.

YOU WILL **NOT** BE MARKED ON THIS SECTION

CHALLENGE

Dominic makes a tile pattern from a square of red tiles surrounded by a border of blue tiles.



- a Copy and complete the table for the number of tiles in each pattern in the sequence.
- b Work out the general term for .
- the number of red tiles
 - the number of blue tiles
 - the total number of tiles.
- c Investigate similar patterns using rectangles.

	1	2	3	4	5	6
Red tiles	1					
Blue tiles	8					
Total number of tiles	9					