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EDEXCEL INTERNATIONAL GCSE MATHS: QUESTIONS BY TOPIC

Sequences (A3)

International GCSE Mathematics A (4MA1) · Foundation tier

31 questions · 118 marks · Mark schemes included

Past papers June 2018 - June 2025 · 2 sub-topics

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 Piccadilly Business Centre, Unit C, Aldow Enterprise Park
Blackett Street, Manchester, M12 6AE

HOW TO USE THIS BOOKLET

Questions are grouped by sub-topic and run from the lowest to the highest mark tariff, then oldest paper first.

Click any row below to jump straight to that sub-topic or question.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme; < QUESTION brings you back.

A gold bar in the left margin marks exactly where the question sits on the original page.

Diagrams, graphs, grids and tables are printed exactly as they appear in the original papers.

Each question is filed under its main topic; longer questions may also test skills from other topics.

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2. Q5	IGCSE Paper 1FR June 2023	2	4
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25. Q4	IGCSE Paper 1F January 2020	5	27
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QUESTIONS

31 questions · 118 marks · 2 sub-topics

SUB-TOPIC A3a

LINEAR SEQUENCES & NTH TERM

Sub-topic A3a · 30 questions · 115 marks · lowest tariff first



16 A plane flew from Madrid to Dubai.

The distance the plane flew was 5658 km.

The flight time was 8 hours 12 minutes.

Work out the average speed of the plane.

..... km/h

(Total for Question 16 is 3 marks)

17 Here are the first 4 terms of an arithmetic sequence.

85 79 73 67

Find an expression, in terms of n , for the n th term of the sequence.

.....

(Total for Question 17 is 2 marks)



5 Here are the first four terms of a number sequence.

2 6 10 14

Elsie correctly works out that the next term in the sequence is 18

(a) Explain how she was able to work this out.

(1)

(b) Explain why 217 cannot be a number in the sequence.

(1)

(Total for Question 5 is 2 marks)



18 Anjali travels on the Eurostar train from Paris to Amsterdam.

The distance the train travels between Paris and Amsterdam is 515 km.

The time taken by the train to travel between Paris and Amsterdam is
3 hours 18 minutes.

Work out the average speed of the train.

Give your answer in km/h correct to the nearest whole number.

..... km/h

(Total for Question 18 is 3 marks)

19 Here are the first four terms of an arithmetic sequence.

38 31 24 17

Find an expression, in terms of n , for the n th term of the sequence.

.....

(Total for Question 19 is 2 marks)



9 Here are the first four terms of a number sequence.

5 12 19 26

(i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you worked out your answer.

.....
(1)

(Total for Question 9 is 2 marks)

10 The table shows information about the number of cars sold by a garage in each of 30 weeks.

Number of cars sold	Frequency
1	4
2	10
3	5
4	7
5	4

Work out the mean number of cars sold per week.

.....
(Total for Question 10 is 3 marks)



- 11 A sequence is formed by adding 1 to each square number.
Here are the first five terms of the sequence.

2 5 10 17 26

- (a) Find the 10th term of the sequence.

.....
(1)

1025 is a term of this sequence.

- (b) Which term?

.....
(2)

.....
(Total for Question 11 is 3 marks)



22 Here are the first four terms of an arithmetic sequence.

6 10 14 18

(a) Find an expression, in terms of n , for the n th term of this sequence.

.....
(2)

(b) Write down an expression, in terms of n , for the $(n + 1)$ th term of this sequence.

.....
(1)

(Total for Question 22 is 3 marks)

23 (a) Write 1 390 000 in standard form.

.....
(1)

(b) Write 0.005 in standard form.

.....
(1)

(Total for Question 23 is 2 marks)



5 Adisha plays basketball for her school.

Here is the number of points that she scored in each of nine games.

15 16 15 18 17 15 13 19 18

(a) Find the mode of the numbers of points that Adisha scored.

.....
(1)

(b) Work out the range of the numbers of points that Adisha scored.

.....
(2)

(Total for Question 5 is 3 marks)

6 Here are the first four terms of a number sequence.

4 8 12 16

(a) Write down the next term of the sequence.

.....
(1)

(b) Explain how you found your answer to part (a).

.....
(1)

(c) Find an expression, in terms of n , for the n th term of the sequence.

.....
(1)

(Total for Question 6 is 3 marks)



5 Here are the first 4 terms of a number sequence.

7 12 17 22

(a) (i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you worked out your answer.

.....
(1)

(b) Is 256 a number in the sequence?

Tick one of the boxes below and give a reason for your answer.

Yes

☐

No

☐

Give a reason for your answer.

.....
.....
(1)

(Total for Question 5 is 3 marks)



16 Here are the first five terms of an arithmetic sequence.

1 5 9 13 17

(a) Find an expression, in terms of n , for the n th term of this sequence.

.....
(2)

The n th term of another arithmetic sequence is $3n + 5$

(b) Find an expression, in terms of m , for the $(2m)$ th term of this sequence.

.....
(1)

(Total for Question 16 is 3 marks)



7 Here are the first five terms of a number sequence.

1 7 13 19 25

(a) (i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you worked out your answer.

.....
(1)

(b) Explain why 188 cannot be a number in the sequence.

.....
(1)

(Total for Question 7 is 3 marks)

8 Jordan buys 256 notebooks.

He buys the notebooks in packs of 8 notebooks.

Each pack of 8 notebooks costs £2.48

Work out how much the 256 notebooks cost Jordan.

£.....

(Total for Question 8 is 3 marks)



16 Here are the first four terms of an arithmetic sequence.

1 4 7 10

(a) Find an expression, in terms of n , for the n th term of this sequence.

.....
(2)

The n th term of a different arithmetic sequence is $5n + 17$

(b) Find the 12th term of this sequence.

.....
(1)

.....
(Total for Question 16 is 3 marks)



7 Here are the first five terms of a number sequence.

−3 5 13 21 29

(a) (i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you worked out your answer.

.....
(1)

(b) Explain why 326 cannot be a term of the sequence.

.....
.....
(1)

.....
(Total for Question 7 is 3 marks)



6 Here are the first four terms of a number sequence.

7 11 15 19

(a) Write down the next term of the sequence.

.....
(1)

(b) Explain how you found your answer to part (a)

.....
.....
(1)

(c) Find the 12th term of the sequence.

.....
(1)

(Total for Question 6 is 3 marks)

7 The normal price of a calculator is £26.80

Amy gets $\frac{1}{4}$ off the normal price with her student discount card.

Amy buys 2 of these calculators.
She pays with a £50 note.

How much change should Amy receive?

£.....

(Total for Question 7 is 4 marks)



17 Here are the first five terms of a number sequence S .

10 16 22 28 34

(a) Find an expression, in terms of n , for the n th term of this sequence.

(2)

The n th term of a sequence T is given by $n^2 - 3$

There are numbers that are terms in both the sequence S and the sequence T .

(b) Find one of these numbers.

(2)

(Total for Question 17 is 4 marks)

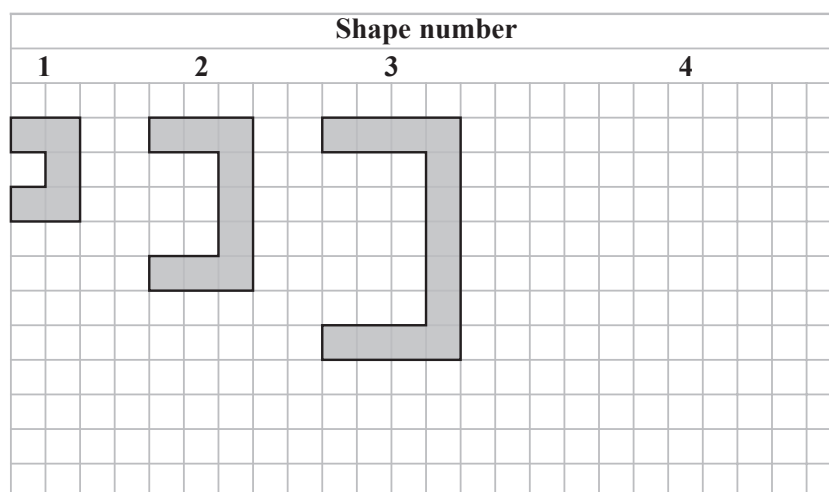
18 On Saturday, Jacob walked 10 800 steps.
On Sunday, he walked 7% more steps than on Saturday.

Work out how many steps Jacob walked on Sunday.

(Total for Question 18 is 3 marks)



- 5 A sequence of shapes is made by shading squares on a square grid.



- (a) On the grid, draw Shape number 4

(1)

- (b) Complete the table.

Shape number	1	2	3	4	5
Number of shaded squares	5	9	13		

(1)

- (c) Find the number of shaded squares in Shape number 8

(1)

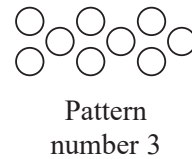
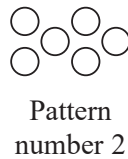
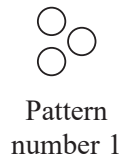
- (d) Explain why no shape in the sequence is made by shading exactly 50 squares.

(1)

(Total for Question 5 is 4 marks)



11 Here is a sequence of patterns made from counters.



(a) In the space below, draw Pattern number 4

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of counters	3	6	9		

(1)

(c) Work out the number of counters in Pattern number 10

(1)

Sven has exactly 70 counters.

(d) Can Sven make Pattern number 25 using his 70 counters?

Tick the appropriate box below.

Yes	No
☐	☐

Give a reason for your answer.

(1)

(Total for Question 11 is 4 marks)

18 In a warehouse there are two types of shelves, type **R** and type **S**.

These two types of shelves are arranged into shelving units that form a sequence of patterns.

Here are the first three terms in the sequence.

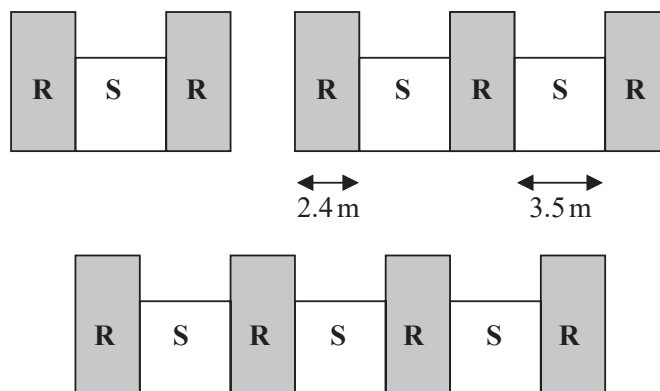


Diagram **NOT**
accurately drawn

The width of each type **R** shelf is 2.4 m and the width of each type **S** shelf is 3.5 m

(a) Work out the total width of a shelving unit that has 6 type **R** shelves.

..... m
(2)

A shelving unit has n type **R** shelves.
The total width of this shelving unit is W metres.

(b) Find an expression for W in terms of n
Give your answer in its simplest form.

$W =$
(2)

(Total for Question 18 is 4 marks)

3 Here are the first five terms of a number sequence.

7 13 19 25 31

(a) (i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you found your answer to part (a)(i)

.....
(1)

The 30th term of the sequence is 181

(b) Work out the 28th term of the sequence.

.....
(1)

Brian says that 96 is a number in the sequence.
Brian is wrong.

(c) Explain why.

.....
.....
(1)

(Total for Question 3 is 4 marks)



3 A sequence of patterns is made from squares.

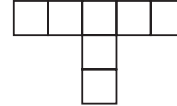
Pattern number 1



Pattern number 2



Pattern number 3



(a) In the space below, draw Pattern number 4

Pattern number 4

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of squares	1	4	7		

(1)

(c) Work out the number of squares in Pattern number 8

(1)

Angus says

“there are 42 squares in Pattern number 15”

Angus is incorrect.

(d) Explain why.

(1)

(Total for Question 3 is 4 marks)



6 Here are the first five terms of a number sequence.

4 10 16 22 28

(a) (i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you worked out your answer.

.....
(1)

(b) Work out the 13th term of the sequence.

.....
(1)

(c) Explain why 467 cannot be a number in the sequence.

.....
.....
(1)

(Total for Question 6 is 4 marks)

4 Here is a sequence of patterns made from sticks.



Pattern number 1



Pattern number 2



Pattern number 3

(a) In the space below, draw Pattern number 4

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of sticks	5	9	13		

(1)

(c) Work out the number of sticks in Pattern number 10

(1)

Connor says that in Pattern number 25 there are 102 sticks.

(d) Explain why Connor is wrong.

(1)

(Total for Question 4 is 4 marks)

4 Here are the first five terms of a number sequence.

106 99 92 85 78

(a) (i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you found your answer to part (a)(i)

.....
(1)

The 9th term of the sequence is 50

(b) Work out the 12th term of the sequence.

.....
(1)

Umberto says 7 is a term in the sequence.
Umberto is wrong.

(c) Explain why.

.....
.....
(1)

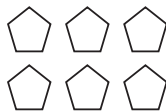
(Total for Question 4 is 4 marks)



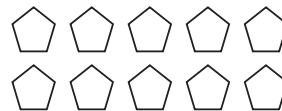
3 Here is a sequence of patterns made from identical pentagons.



Pattern
number 1



Pattern
number 2



Pattern
number 3

(a) (i) Work out the number of pentagons in Pattern number 4

(ii) Explain how you worked out your answer.

(2)

A different sequence of patterns is made from identical hexagons.
The rule below can be used to find the number of hexagons in each pattern of this sequence.

Multiply the Pattern number by 5 and subtract 1

(b) Work out the number of hexagons in Pattern number 7

(1)

A pattern in this sequence has exactly 59 hexagons.

(c) Work out its Pattern number.

(2)

(Total for Question 3 is 5 marks)

9 Here is a sequence of patterns made from white counters and black counters.



Pattern
number 1



Pattern
number 2



Pattern
number 3

(a) In the space below, complete Pattern number 4



(1)

(b) Find the **total** number of counters in Pattern number 6

(1)

(c) Work out the number of **black** counters in Pattern number 14

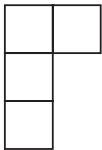
(1)

(d) Work out the **total** number of counters in Pattern number 50

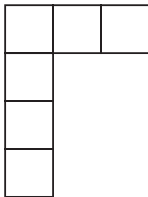
(2)

(Total for Question 9 is 5 marks)

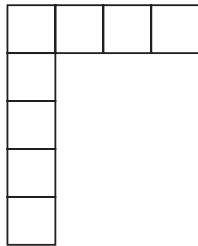
4 Here is a sequence of patterns made from square tiles.



Pattern number 1



Pattern number 2



Pattern number 3

(a) In the space below, draw Pattern number 4

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of tiles	4	6	8		

(1)

(c) Work out the number of tiles in Pattern number 30

.....
(2)

Liz says that in Pattern number n , the number of tiles is $2n$.

(d) Is Liz correct?

You must give a reason for your answer.

(1)

(Total for Question 4 is 5 marks)

5 Paul is buying a sandwich and a drink in a meal deal.

He can have a cheese sandwich (C) or an egg sandwich (E) or a tomato sandwich (T).

He can have orange juice (O) or milk (M) or water (W) to drink.

Write down all the possible combinations Paul can buy.

(Total for Question 5 is 2 marks)



6 Here are the first five terms of a number sequence.

3 7 11 15 19

(a) Write down the next term of the sequence.

.....
(1)

(b) Explain how you worked out your answer.

.....
(1)

(c) Find the first number greater than 70 that is in the sequence.

.....
(2)

Ada says,

“96 is a number in the sequence”

(d) Is Ada correct?

You must give a reason for your answer.

.....
.....
(1)

(Total for Question 6 is 5 marks)



2 Here are the first five terms of a number sequence.

11 15 19 23 27

(a) (i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you found your answer to part (a)(i)

.....
(1)

The 14th term of the sequence is 63

(b) Find the sum of the 16th term and the 17th term of the sequence.

.....
(2)

Felix says that 98 is a term of the sequence.
Felix is wrong.

(c) Explain why Felix is wrong.

.....
.....
(1)

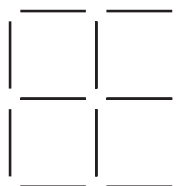
(Total for Question 2 is 5 marks)



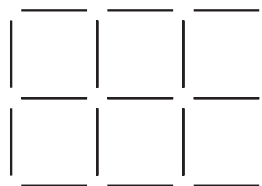
6 Here is a sequence of patterns made from sticks.



Pattern
number 1



Pattern
number 2



Pattern
number 3

(a) In the space below, draw Pattern number 4

(1)

(b) How many sticks are needed to make Pattern number 7?

(2)



(c) Work out the Pattern number of the pattern made from exactly 62 sticks.

.....
(2)

Pedro says,

“There will be a pattern in the sequence with exactly 123 sticks.”

(d) Is Pedro correct?

You must give a reason for your answer.

.....
.....
.....
(1)

(Total for Question 6 is 6 marks)



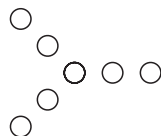
9 Here is a sequence of patterns made from circles.



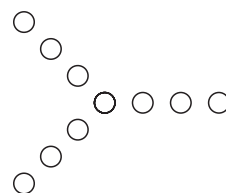
Pattern
number 1



Pattern
number 2



Pattern
number 3



Pattern
number 4

(a) In the space below, draw Pattern number 5

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5	6
Number of circles	1	4	7	10		

(1)

(c) Work out the number of circles in Pattern number 8

(1)

C is the number of circles in Pattern number P

(d) Write down a formula for C in terms of P

(2)



A different sequence of patterns is made from triangles.
The rule to find the number of triangles in each pattern is

multiply the Pattern number by 5 and subtract 4

- (e) Is there a pattern in this sequence that is made from exactly 136 triangles?
You must give a reason for your answer.

(1)

(Total for Question 9 is 6 marks)

- 10 Here are four different numbers written in order of size.

3 6 m n

The range of the four numbers is 13
The median of the four numbers is 8.5

Find the value of m and the value of n .

$m =$

$n =$

(Total for Question 10 is 2 marks)



6 Here is a sequence of patterns made from dots.


Pattern
number 1


Pattern
number 2


Pattern
number 3

Pattern
number 4

(a) Draw Pattern number 4 in the space above.

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of dots	4	8	12		

(1)

(c) Work out the number of dots in Pattern number 13

(2)

(d) Find an expression, in terms of n , for the number of dots in Pattern number n .

(1)

There are fewer than 90 dots in Pattern number k .

(e) What is the largest possible value of k ?

(2)

(Total for Question 6 is 7 marks)



SUB-TOPIC A3b

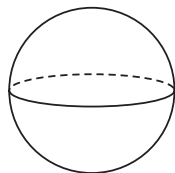
QUADRATIC, GEOMETRIC & OTHER SEQUENCES

Sub-topic A3b · 1 question · 3 marks · lowest tariff first

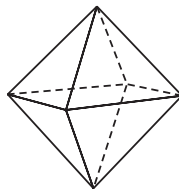


2 The diagram shows some 3-D shapes.

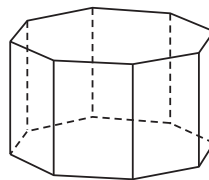
Shape A



Shape B



Shape C



(a) What is the mathematical name of shape A?

.....
(1)

(b) How many edges has shape B?

.....
(1)

(c) How many faces has shape C?

.....
(1)

(Total for Question 2 is 3 marks)

3 Here are the first five terms of a number sequence.

1 3 9 27 81

(a) Find the next term of this sequence.

.....
(1)

(b) Explain how you found this term.

.....
.....
(1)

The 9th term of this number sequence is 6561

(c) Find the 10th term of this sequence.

.....
(1)

(Total for Question 3 is 3 marks)



MARK SCHEMES

official mark schemes, in the same order as the questions



17		$91 - 6n$	2	B2 for a correct answer in any form eg $91 - 6 \times n$ or $-6n + 91$ or $85 + (n - 1)(-6)$ oe (B1 for $-6n + k$ oe (k may be zero or absent)) NB: award full marks for eg $x = 91 - 6n$ or nth term = $91 - 6n$ but only B1 for $n = 91 - 6n$
Total 2 marks				

5	(a)		Correct explanation	1	B1 eg 'she added 4', 'add 4', '+4, rule is $4n - 2$, goes up by 4, $4 \times 5 - 2 (= 18)$
	(b)	Acceptable answers 1. (the) sequence is even 2. (217) is odd or not even 3. 'nth term is $4n - 2$ which will always be even' 4. 'sequence goes 214, 218' 5. (the) 54 th term is 214 6. it would be 218 (not 217) 7. $4n - 2$ so n is not an integer/whole number 8. $219 \div 4$ oe ($= 54.75$) not an integer/whole number 9. not 2 less than a multiple of 4 10. does not end with 0, 2, 4, 6 and 8 (must have all 5 numbers) 11. each digit has an even digit at the end/does not end in an even number Not acceptable answers 1. adding 4 each time will not lead to 217 2. it goes past 217 3. $217 \div 4 (= 54.25)$ not an integer/whole number	Correct explanation	1	B1
					Total 2 marks

18	3.3 or $\frac{33}{10}$ or $3\frac{3}{10}$ or $3\frac{18}{60}$ oe or $180 + 18$ or 198 oe		3	B1 for working out the time in hours or minutes
	$515 \div 3.3$ or $515 \div \frac{33}{10}$ or $515 \div 3\frac{3}{10}$ or $\frac{515}{"198"} \times 60$ oe			M1 Units must be consistent
	Correct answer scores full marks (unless from obvious incorrect working)	156		A1 allow $156 - 156.1$ SCM1 for $515 \div 3.18 (= 161.9... \text{ or } 162)$
				Total 3 marks
19			2	M1 for $-7n + k$ ($k \neq 45$) or $-7 \times n + k$ ($k \neq 45$) or $n \times -7 + k$ ($k \neq 45$) (k may be zero or absent or negative)
		$45 - 7n$		A1 oe eg $45 - 7 \times n$ oe or $-7 \times n + 45$ oe or $U_n = 45 - 7n$ oe or $38 - 7(n - 1)$ oe NB: award full marks for eg $x = 45 - 7n$ oe or $n\text{th term} = -7 \times n + 45$ oe or but only M1 for $n = 45 - 7n$ oe
	Correct answer scores full marks (unless from obvious incorrect working)			Total 2 marks

8	eg 8 small squares = 16 or 2 large squares = 16 or 2 small squares = 4 or [small square =] $16 \div 8 (= 2)$ or [large square =] $16 \div 2 (= 8)$ or [small square =] $4 \div 2 (=2)$ or [2 small squares] = $16 \div 4 (=4)$ or Friday = 28 (toys) and Thursday = 12 (toys)		3	M1	for starting to work with proportion may be seen in a square on the pictogram or in working or implied by correct working or for finding the correct number of toys sold on Thursday and Friday
	eg $9 \times "2"$ oe or $2.25 \times "8"$ oe or $4.5 \times "4"$ oe			M1	for a complete method to find the toys sold on Monday
	Correct answer scores full marks (unless from obvious incorrect working)	18		A1	cao

9	(i)		33	1	B1
	(ii)		Added 7	1	B1 accept eg add 7, $(n) + 7$, $7n - 2$
Total 2 marks					

10	$1 \times 4 + 2 \times 10 + 3 \times 5 + 4 \times 7 + 5 \times 4 (= 87)$ or $4 + 20 + 15 + 28 + 20 (= 87)$		3	M1 for at least 4 correct products and intention to add. Products may be seen by the side of the table.
	“87” $\div 30$ oe			M1 dep on M1. Allow use of their “30” from adding the frequencies from the table.
	Correct answer scores full marks (unless from obvious incorrect working)	2.9		A1 accept an answer of 3 if correct working seen eg $87 \div 30$ oe
Total 3 marks				

Question	Working	Answer	Mark	Notes
11	a	101	1	B1
	b	32	2	M1 A1
12	$180 - 124 = 56$ $56 \div 2$	28	3	M1 M1 A1
13	$\frac{21}{24} - \frac{4}{24}$	Shown	2	M1 for 2 correct fractions with a common denominator A1 for $\frac{17}{24}$ from correct working e.g. $\frac{34}{48} = \frac{17}{24}$
14	a	$15 - 8 \times (-4)$ or $15 + 32$	2	M1 A1
	b	$18 = 4p - 24$	2	M1 A1 oe $M1 \frac{18}{4} = p - 6$
15	240 m, 200 f $\frac{65}{100} \times "240" (= 156)$ or $\frac{85}{100} \times "200" (= 170)$ $156 + 170$	326	4	B1 for 240 and 200 M1 as long as their numbers add up to 440 M1 (dep M1) A1 SC:B2 for 334

22	(a)		$4n + 2$	2	M1 for $4n + k$ (k may be 0 or absent) oe
					A1 oe e.g $6 + (n - 1)4$
	(b)		$4n + 6$	1	B1 oe ft part (a) providing M1 in part (a) is awarded e.g $4(n + 1) + 2$
					Total 3 marks

23	(a)		1.39×10^6	1	B1
	(b)		5×10^{-3}	1	B1
					Total 2 marks



3		$7x$	1	B1	cao
		$28p$	1	B1	cao
Total 2 marks					

4	(a)		548	1	B1	cao
	(b)		4.6	1	B1	allow 4.6000....
	(c)	$(32 - 5) \div 2$		2	M1	
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	13.5		A1	oe
					Total 4 marks	

5	(a)		15	1	B1	cao
	(b)	19 – 13		2	M1	19 and 13 selected or $a - b$ where $a = 19$ or $b = 13$
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	6		A1	cao
						Total 3 marks

6	(a)		20	1	B1	cao
	(b)		add 4	1	B1	oe 4 times table or $4n$ or goes up in 4's, allow 'the gap is +4' but not 'the gap is 4'
	(c)		$4n$	1	B1	$4n + 0$ not $n = 4 \times n$
Total 3 marks						

5	(a)(i)		27	1	B1
	(ii)		Add 5	1	B1 accept +5 or use of $5n+2$
	(b)		No and reason	1	B1 e.g. 'because the unit digit of 256 is not 2 or 7' or it is not in the form $5n+2$
Total 3 marks					

6	(a)		0.4, 0.407, 0.47, 0.477, 0.74	1	B1
	(b)		$\frac{7}{10}$	1	B1 oe
	(c)			2	M1 for $\frac{30}{48}$ oe
			$\frac{5}{8}$		A1
	(d)		0.23	1	B1
	(e)	$1 - \left(\frac{1}{2} + \frac{2}{5}\right) \left(= \frac{1}{10}\right)$ oe		3	M1 for a method to find the remaining fraction of beads
		$3 \times "10"$ or $3 \div " \frac{1}{10} "$ oe			M1
			30		A1
Total 8 marks					



16	(a)		2	M1 for $4n + k$ ($k \neq -3$) or $4 \times n + k$ ($k \neq -3$) or $n \times 4 + k$ ($k \neq -3$) (k may be zero or absent)
		$4n - 3$		A1 oe e.g. $1 + (n-1)4$ oe or $4 \times n - 3$ oe or $n \times 4 - 3$ oe NB: award full marks for eg $x = 4n - 3$ oe or $x = 4 \times n - 3$ oe or $x = n \times 4 - 3$ oe or n th term = $4n - 3$ oe or n th term = $4 \times n - 3$ oe or n th term = $n \times 4 - 3$ oe but only M1 for $n = 4n - 3$ oe
	(b)	$6m + 5$	1	B1 for $3(2m) + 5$ oe or $6m + 5$ or $3 \times 2m + 5$ oe or $6 \times m + 5$ Allow $3(2n) + 5$ or $6n + 5$ oe
Total 3 marks				

7	(a)(i)	31	1	B1
	(ii)	Correct explanation	1	B1 e.g. 'I added 6', 'add 6', '+6, $6n - 5$ (need to know 6 and we need to add/go up oe)
	(b)	Correct explanation	1	B1 Acceptable e.g. • Should be 187 oe • 188 is even or not odd • 187 and 193 (are in the sequence) • Terms end in 1, 3, 5, 7, 9 or odd numbers • Sequence is odd • $6n - 5 = 188$ gives a decimal or not a whole number • Need to minus 1 oe Not acceptable e.g. • It goes past 188 oe • 193 is after 188 oe
Total 3 marks				
8	$256 \div 8 (= 32)$ or $8 \times 32 = 256$ or $2.48 \div 8 (= 0.31)$		3	M1 for a correct first step
	$"32" \times 2.48$ or $256 \times "0.31"$			M1 for a complete method or $\frac{1984}{25}$
		79.36		A1
Total 3 marks				

16	(a)		2	M1 for $3n + k$ ($k \neq -2$) or $3 \times n + k$ ($k \neq -2$) or $n \times 3 + k$ ($k \neq -2$) (k may be zero or absent)
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	$3n - 2$		A1 oe eg $1 + (n - 1)3$ oe or $3 \times n - 2$ oe or $n \times 3 - 2$ oe NB: award full marks for eg $x = 3n - 2$ oe or $x = 3 \times n - 2$ oe or $x = n \times 3 - 2$ oe or n th term = $3n - 2$ oe or n th term = $3 \times n - 2$ oe or n th term = $n \times 3 - 2$ oe or $3x - 2$ Allow eg T_n or U_n or a_n for n th term but only M1 for $n = 3n - 2$ oe or $x = 3x - 2$
	(b)	77	1	B1 cao
Total 3 marks				



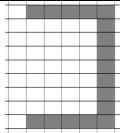
7	(a)(i)		37	1	B1
	(ii)		Added 8	1	B1 eg 'added 8', 'add 8', +8, rule is $8n - 11$, goes up by 8, $8 \times 6 - 11 (= 37)$
	(b)	Acceptable answers 1. (the) sequence is odd 2. (326) is even or not odd 3. 'nth term is $8n - 11$ which will always be odd' 4. 'sequence goes 325, 333' 5. (the) 42nd term is 325 6. should be 325 (not 326) 7. it would be 333 (not 326) 8. $8n - 11$ so n is not an integer/whole number 9. $337 \div 8$ oe (= 42.125) not an integer/whole number 10. not 11 less than a multiple of 8 11. does not end with 1, 3, 5, 7 and 9 (must have all 5 numbers) 12. each digit has an odd digit at the end/does not end in an odd number Not acceptable answers 1. adding 8 each time will not lead to 326 2. it goes past 326 3. $326 \div 8 (= 40.75)$ not an integer/whole number 4. 326 cannot be divided by 8	Correct explanation	1	B1
					Total 3 marks



5	(a)	60	1	B1	cao
	(b)	0.19	1	B1	
	(c)	$\frac{16}{20}$ oe eg $\frac{8}{10}$ or answer of $\frac{1}{5}$	2	M1	for a correct unsimplified fraction eg $\frac{16}{20}$ or answer of $\frac{1}{5}$ or 0.8 or 80% or for any fraction that will cancel written in simplest form eg $\frac{15}{20} = \frac{3}{4}$ or $\frac{4}{16} = \frac{1}{4}$
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{4}{5}$	A1	cao NOTE: do not ISW eg $\frac{4}{5}$ then answer of 0.8 or 80% is M1A0
Total 4 marks					

6	(a)	23	1	B1	cao
	(b)	Added 4	1	B1	Acceptable examples add 4 +4 $19 + 4 (= 23)$ (rule is) $4n + 3$ goes up by 4 $4 \times 5 + 3 (= 23)$ $(n) + 4$ $(3n) + 4$ Not acceptable examples $11 - 7 = 4$ difference is 4 we subtract the first number and the next number and it gives us the answer
	(c)	51	1	B1	cao
Total 4 marks					

Question	Working	Answer	Mark	Notes
16	$0.5 \times 6 \times 6 \times 5 (= 90)$ $0.5 \times \pi \times 3^2 \times 5 (= 22.5\pi = 70.6858\dots)$ or $\pi \times 3^2 \times 5 (= 45\pi = 141.37166\dots)$ '90' – '70.6858.....'	19.3	4	M1 Correct method for volume of A M1 Correct method for volume of B or correct volume of cylinder M1 Correct method to find the difference in the volume A1 $19 - 19.4$
17 (a)		$6n + 4$	2	M1 for $6n + k$ (k may be 0 or absent) oe A1 oe eg $10 + (n - 1)6$ or $n \times 6 + 4$
(b)	...40, 46,... -2, 1, 6, 13, 22, 33 46 ... $6n + 4 = n^2 - 3$ oe	e.g. 22 or 46	2	M1 continuing sequence and writing at least 5 terms of 2 nd sequence – allow one error or A1 for a correct equation ft part (a) or other number in both sequences eg -2
18	$0.07 \times 10\,800 (= 756)$ oe $10\,800 + '756'$	11 556	3	M1 M1 A1 M2 for $1.07 \times 10\,800$ oe
19 (a)		2, 4, 6, 8, 10, 12	1	B1
(b)		8, 10, 12	1	B1
(c)		1, 3, 5	1	B1
(d)		$\frac{9}{12}$	2	M1 A1 for 9 or $\frac{m}{12}$ ($m < 12$) oe

5	(a)		Correct shape	1	B1 cao
	(b)		17, 21	1	B1 cao
	(c)		33	1	B1 cao
	(d)		The numbers of shaded squares are odd numbers	1	B1 Accept e.g. 50 is an even number or the sequence is all odd numbers or 49 is in the sequence so 50 can't be as it's only one more or 53 is the next number after 49 or 49 and 53 are in the sequence (so not 50) or nth term is $4n + 1$ and for 50 $n = 12.25$ / not an integer
Total 4 marks					

6	$6 \times 100 (= 600)$ or $17.5 \div 100 (= 0.175)$		3	B1
	"600" $\div 17.5 (= 34.28\dots)$ or $6 \div "0.175" (= 34.28\dots)$			M1 ft incorrect conversion
		34		A1 cao
Total 3 marks				

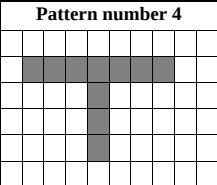
11	(a)			1	B1 correct diagram drawn
	(b)		12, 15	1	B1
	(c)		30	1	B1
	(d)	eg Pattern number 25 needs 75 counters (or $3 \times 25 = 75$) or 70 counters can make only up to Pattern number 23 $\frac{70}{25} = 2.8$ or $\frac{70}{3} = 23.(3....)$ 70 is 5 short or sight of e.g. $3n$ or ...69, 72, ... 70 is not a multiple of 3	No and reason	1	B1 'No' with reason given (reason can be in words or shown as a calculation)
					Total 4 marks

17	(a)		0.45	1	B1 oe eg $\frac{9}{20}, \frac{45}{100}, 45\%$
	(b)	eg $1 - (0.25 + 0.2 + 0.2) (= 0.35)$ or $1 - ("0.45" + 0.2) (= 0.35)$ or $300 \times (0.25 + 0.2 + 0.2) (= 195)$		3	M1 allow use of their "0.45" from part (a), check the table
		eg $300 \times "0.35"$ or $300 - "195"$			M1 for a complete method
			105		A1 cao (award $\frac{105}{300}$ M2 only)
Total 4 marks					

18	(a)	eg $6 \times 2.4 + 5 \times 3.5$		2	M1
			31.9		A1 oe
	(b)	($W =$) $5.9n$ or ($W =$) $5.9(n - 1) + 2.4$ or ($W =$) $2.4n + 3.5(n - 1)$		2	M1 for $2.4n + 3.5n$ or $5.9n$ seen
			$5.9n - 3.5$		A1 oe but must be in simplest form eg $-3.5 + 5.9n$
Total 4 marks					

19		$5 \times 12 (= 60)$ or $\frac{15 + 7 - 2 + 23 + x}{5} = 12$ oe or $\frac{x + "43"}{5} = 12$		3	M1 for a method to find the total of the 5 numbers or setting up an equation in x "43" comes from $15 + 7 - 2 + 23$
		$x + 15 + 7 - 2 + 23 = "60"$ or $x + "43" = "60"$ or $"60" - (15 + 7 - 2 + 23)$			M1 for forming an equation with their 60 or for a complete calculation to find the value of x "43" comes from $15 + 7 - 2 + 23$
			17		A1
Total 3 marks					

3	(a)(i)		37	1	B1
	(ii)		+6	1	B1 oe eg 'added 6' or 'plus 6' or $6n + 1$ allow $31 + 6 = 37$ increase by 6 / goes up by 6
	(b)		169	1	B1
	(c)		All the numbers in the sequence are odd numbers	1	B1 96 is not odd / 96 is even 96 is a multiple of 6 (and terms are not multiples of 6) or No numbers in the sequence end in 6 / all end in 1, 3, 5, 7, 9 or the sequence is $6n + 1$ or it goes 91, 97, ... oe or it should be 97 They need to add 1
					Total 4 marks
4	(a)		B	1	B1 Accept b or 'Country B' allow incorrect spelling if meaning is clear
	(b)		bar at height of 7	1	B1 any width is acceptable
	(c)		11	1	B1 Allow 11 million or 11 000 000 in the answer space
					Total 3 marks

3	(a)	Pattern number 4 										Correct shape	1	B1
	(b)	1	2	3	4	5		10 and 13	1	B1 for 10 and 13				
		1	4	7	10	13								
	(c)							22	1	B1				
	(d)	10 13 16 19 22 25 28 31 34 37 40 43 or $3 \times 15 - 2 (= 43)$ and $3 \times 14 - 2 (= 40)$ or $(42 + 2) \div 3 (= 14.6\dots)$						Correct reason	1	B1 for correct reason, for e.g. $3n - 2 = 42$ does not have a whole number (integer) answer/it's a decimal or 42 is a multiple of 3 or 42 is in the 3 times table or 40 and 43 are in the sequence or 40 is in the sequence and $40 + 3$ does not equal 42 or its 1 less than 43				
										Total 4 marks				

6	(a)(i)		34	1	B1	
	(ii)		Added 6	1	B1	accept eg add 6, +6
	(b)		76	1	B1	
	(c)		Correct explanation	1	B1	eg 467 is odd or the numbers in the sequence are even or $6n - 2$ or ..., 466, 472, ...
					Total 4 marks	
7	(a)	eg 60 : 24		2	M1	for any ratio equivalent to 60 : 24 or for an answer of 2 : 5
		Correct answer scores full marks (unless from obvious incorrect working)	5 : 2		A1	
	(b)		$\frac{3}{10}$	1	B1	
	(c)	eg $20 \div 4 (= 5)$ or $20 \div 4 \times 11 (= 55)$ or $\frac{x}{11} = \frac{20}{4}$ or $\frac{x}{20} = \frac{11}{4}$		3	M1	for a correct first step
		eg $11 \times "5" + 20$ or $(11 + 4) \times "5"$			M1	for a complete method
		Correct answer scores full marks (unless from obvious incorrect working)	75		A1	
					Total 6 marks	

4	(a)			1	B1
	(b)		17, 21	1	B1 Ignore any extra numbers if the 2 that are required are there
	(c)		41	1	B1
	(d)		A correct reason	1	B1 The numbers of sticks are always an odd number (always ends in 1,3,5,7,9) 102 is even, pattern 25 has 101 sticks, The pattern goes ...97, 101, 105... It is $4n + 1$ so $4 \times 25 + 1 = 101$ (or does not =102) The pattern never ends in a 2
Total 4 marks					



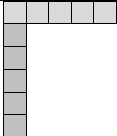
Question	Working	Answer	Mark	Notes
3	(a)(i)	14	1	B1
	(a)(ii)	Added 4	1	B1 Accept +4, 4 more, jumped forward by 4, difference = 4 or sight of $4n - 2$
	(b)	34	1	B1
	(c)	$(59 + 1) \div 5$ or $59 = 5n - 1$ or 4, 9, 14, 19, ..., 54, 59 (may start at 34 or 39)	M1	or for $12 \times 5 - 1$
		12	2	A1
4	(a)	$4.74 - 1.80 (= 2.94)$ or $474 - 180 (= 294)$ "2.94" $\div 2$ or "294" $\div 2$ £1.47	3	M1 M1 dep A1
	(b)	$2 \times 25 + 30$ or 80 (pence) or $2 \times 0.25 + 0.30$ or E.g. $10 \times 25 + 5 \times 30 (= 400)$ $5 \div "0.8"$ or $500 \div "80"$ or 6.25 or $12 \times 25 + 6 \times 30 (= 480)$ or 4.8(0)	3	M1 for method to find total cost of twice as many apples as oranges May work in pence or pounds throughout M1 A1



Question	Working	Answer	Mark	Notes
7	$\frac{60}{100} \times 53.50 (= 32.1(0))$ or $\frac{60}{100} \times 53.50 \times 2 (= 64.2(0))$ $2 \times 53.50 + 2 \times "32.10" (= 171.2(0))$ or $2 \times 53.50 + "64.20" (= 171.2(0))$ $200 - "171.20"$	28.8(0)	4	M1 oe M1 M1 A1
8	(a) (b) $2t = 12 - 3$	$4x + 3y$ 4.5	2 2	B2 (B1 for $4x$ or $+ 3y$) M1 or for $t + \frac{3}{2} = \frac{12}{2}$ A1 oe
9	(a) (b) (c) (d) $3 + 49 \times 2$ or $2n + 1$ or $2 \times 50 + 1$	Pattern 13 15 101	1 1 1 2	B1 B1 B1 M1 A1



3	(a)(i)		kilometres	1	B1 accept m
	(ii)		grams	1	B1 accept g or grammes
	(iii)		square metres	1	B1 accept m ²
	(b)	$\times 1000 (= 1000)$	$\div 1000 (= 0.03)$	3	M1
		$\div 30 (= 33.3\dots)$	$\div '0.03' (= 33.3\dots)$		M1
			33		A1
					SC B2 for 33.3..... or 34
Total 6 marks					

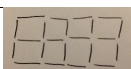
4	(a)		pattern 4 drawn	1	B1
	(b)		10, 12	1	B1
	(c)	14, 16, 18, 20, 22, 24, 26, 28, 30, 32 or $2 \times 30 + 2$ or $12 + (25 \times 2)$ or $4 + (29 \times 2)$ or 31×2 or uses or states $2n + 2$		2	M1 for adding 2 and continuing to at least pattern 15 (allow one error) or for a correct diagram or any correct method which would lead to 62
			62		A1
	(d)	E.g. n th term is $2n + 2$ oe or gives a counter example e.g. when $n = 1$, $2n$ gives 2 (not 4)	No with reason	1	B1 oe
Total 5 marks					



5	a		0.003, 0.035, 0.5, 0.539, 0.9	1	B1
	b		60	1	B1 allow 60%
	c		$8\frac{4}{7}$	1	B1 oe
	d	$0.95 - 0.68$ or $\frac{95}{100} - \frac{68}{100}$ or $\frac{19}{20} - 0.68$ oe		2	M1 or $\frac{27}{100}$ or 27%
			0.27		A1
					Total 5 marks

6	a		23	1	B1
	b		Added 4	1	B1 accept +4, 4 more, oe, $4n - 1$ (need to know 4 and we need to add/go up oe)
	c	(23) 27, 31, 35, 39, 43, 47, 51, 55, 59, 63, 67, 71 OR $4n - 1 = 70$		2	M1 allow list of numbers going up in 4's up to 71 or more (allow one error)
			71		A1
	d	No and identifying all terms in sequence are odd OR No and method to count on as far as 95 (or clearly showing 95) OR No and method to find n when term is 96 e.g. solving $4n - 1 = 96$	No with reason	1	B1 must have 'No' oe or 'is not' oe and a reason.
					Total 5 marks

2	(a)(i)		31	1	B1 (might write more eg 31, 35, 39...)
	(a)(ii)	'The difference between the numbers is 4' is not sufficient	+4	1	B1 add 4, it goes up in 4, $27 + 4$, $4n + 7$ can be awarded for +4 seen joining numbers in list
	(b)	71 and 75 identified		2	M1
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	146		A1
	(c)	- The sequence goes 95, 99 98 is even (23rd term is) 99 not 98 - It jumps straight to 99 - It cannot be an even number - It can only be an odd number - Because the sequence goes up in 4's and starts with an odd number $(98 - 7) \div 4$ is not a whole number - All the numbers in the sequence are not divisible by 2 and this is - The formula is $4n + 7$ - All of the numbers in the sequence end with 1, 3, 5, 7 or 9	eg all the numbers in the sequence are odd numbers	1	B1
Total 5 marks					

6	(a)		Correct shape drawn	1	B1
	(b)	7, 12, 17, 22, 27, 32, 37 or $5 \times 7 + 2$ or $17 + (4 \times 5)$ $7 + (6 \times 5)$			M1 for adding 5 and continuing to at least pattern 7 (allow one error) or for a correct diagram or any correct method which would lead to 37
			37	2	A1
	(c)	7, 12, 17, 22, 27, 32, 37, 42, 47, 52, 57, 62 or $5n + 2 = 62$ or $62 \div 5 (= 12.4)$			M1 for continuing the sequence to at least 62 (list of values may be seen in earlier parts of question)
			12	2	A1
	(d)	For identifying all terms in sequence end in 2 or 7 or none of the numbers end in 3 or method to count on as far as 122 e.g. No, 122 and 127 are both in sequence e.g. No, 122 in sequence or method to find n when term is 123 e.g. solving $5n + 2 = 123$ or $(123 - 2) \div 5 (= 24.2)$ or e.g. 121 not multiple of 5 or $121 \div 5$ not whole number/it's a decimal	No with reason	1	B1
					Total 6 marks

Question	Working					Answer	Mark	Notes
8 (a)		orange	blue	yellow	total		3	B3 All 6 entries correct B2 for 4 or 5 correct entries B1 for 2 or 3 correct entries
	small	6	7	14	27			
	large	13	16	4	33			
	total	19	23	18	60			
(b)						$\frac{23}{60}$	1	B1 Allow 0.38(333...) or 38(.33...)%
(c)						$\frac{13}{33}$	2	B2 B1 for $\frac{n}{33}$ where $n < 33$ or $\frac{13}{m}$ where $m > 13$
								Total 6 marks

9 (a)			1	B1 Correct diagram
(b)		13, 16	1	B1 Both values correct
(c)		22	1	B1
(d)		$C = 3P - 2$ oe	2	B2 B1 for $3P$ or $3P + \text{constant}$ (constant $\neq -2$)
(e)		(Yes) pattern 28 has 136 triangles	1	B1 or $5 \times 28 - 4 = 136$ oe Sight of 28 is sufficient
				Total 6 marks

10	$n - 3 = 13$ oe or $n = 16$ or $(6 + m) \div 2 = 8.5$ oe or $m = 11$		2	M1
		$n = 16$ & $m = 11$		A1 Both values correct
				Total 2 marks



Question	Working	Answer	Mark	Notes
4 (a)		(2, -1)	1	B1
(b)		3.6	1	B1 Allow 3.4 to 3.8 and answers written as fractions in this range eg $3\frac{1}{2}$
(c)		D marked at (-1, -1)	1	B1
Total 3 marks				
5 (a)		24	1	B1 Accept 32 or 40 or 48
(b)		2	1	B1
(c)		No It is divisible by 3	1	B1 Only consider reason if No is given. Allow any reason that shows a clear understanding of why 57 is not prime, eg it is divisible by 19 or 3 or equal to 3×19 .
Total 3 marks				
6 (a)		correct pattern	1	B1 5 dots $\times$ 5 dots open square
(b)		16, 20	1	B1
(c)	eg 4×13 or $14 + 14 + 12 + 12$ or $12 \times 4 + 4$ or 24, 28, 32, 36, 40, 44, 48, 52 or a fully correct diagram		2	M1 allow 1 arithmetical error in continuing the sequence to 13 terms
(d)		52 $4n$	1	A1 B1 oe eg $n + n + n + n$ or $4 + (n - 1)4$
(e)	$90 \div 4$ (= 22.5) or 88		2	M1 or continuing the sequence to 88 or 92 with just one error
		22		A1
Total 7 marks				



3	(a)		243	1	B1	cao
	(b)		Multiplying previous term by 3	1	B1	for multiplying previous term by 3 oe "×3" or 81×3
	(c)		19 683	1	B1	cao
Total 3 marks						

4	(a)		2.7	1	B1	condone 2.7 million
	(b)		Malaysia	1	B1	cao
	(c)		Correct bar drawn	1	B1	for correct bar at a height of 5.4 (within half small square) allow any bar width or location (no gap required) condone stick at correct height.
	(d)		Russia	1	B1	cao
Total 4 marks						

5	(a)		3.0 – 3.2	1	B1	for in the range 3.0 – 3.2
	(b)		Parallelogram	1	B1	allow trapezium
	(c)		2	1	B1	cao
	(d)		Correctly labelled	1	B1	Angle DAB or angle DCB or both labelled
	(e)	$\frac{1}{2}(6+10) \times 4$		2	M1	for correct application of formula allow triangle method
			32		A1	cao
Total 6 marks						