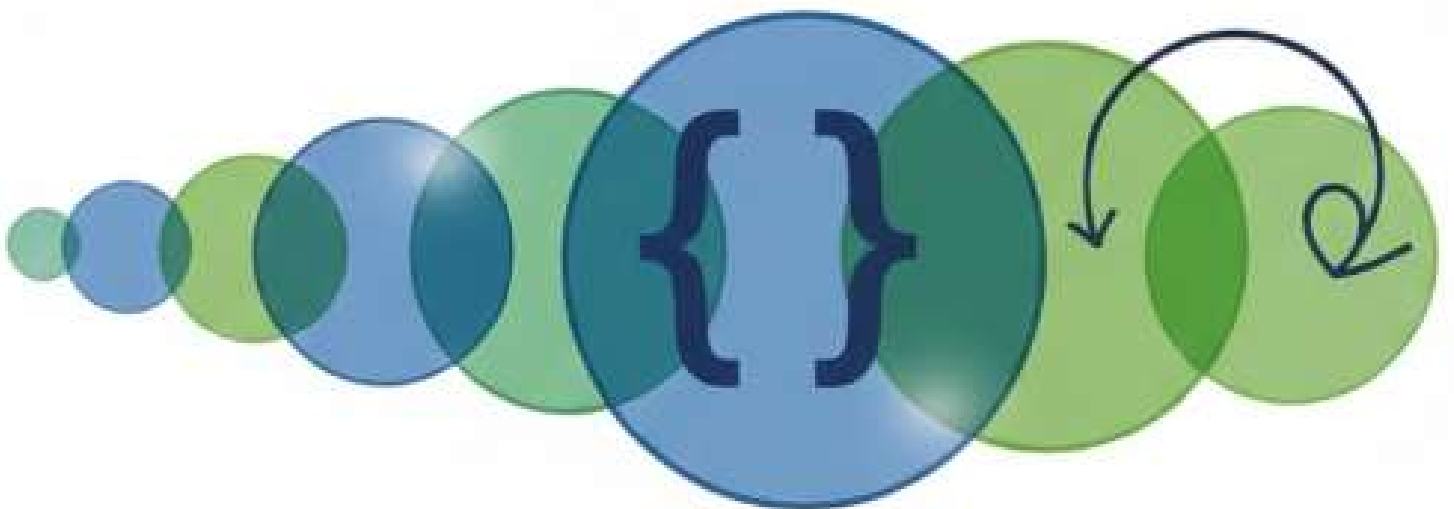

EDEXCEL IGCSE MATHEMATICS

UNIT 2 (MODULAR)

ALGEBRA – SEQUENCES

QP & MS (2018 – 2025)



COMPILED BY:
SIR MUHAMMAD ABDULLAH SHAH



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EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 2 - SEQUENCES

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1. June 2025 1H/Q24

An arithmetic series has 30 terms.

The first term is a

The common difference is d

The 20th term is 123

The sum of the 30 terms is 2880

Work out the value of a and the value of d

Show clear algebraic working.



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$a = \dots\dots\dots$

$d = \dots\dots\dots$

(Total for Question 24 is 5 marks)



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 2 - SEQUENCES

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2. June 2025 1HR/Q24

The first 3 terms of an arithmetic series are

$$(2x + 5) \quad (3y - 4) \quad (4x - 2)$$

where x and y are constants.

The sum of the first 9 terms of the series is 216

Find the value of x and the value of y

Show clear algebraic working.



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$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total for Question 24 is 6 marks)



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3. Nov 2024 1H/Q19

An arithmetic series has first term a and common difference d

The sum of the first 30 terms of the arithmetic series is 4395

The sum of the 10th term and the 20th term is 284

Work out the sum of the first 45 terms of the arithmetic series.
Show clear algebraic working.



(Total for Question 19 is 5 marks)



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EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 2 - SEQUENCES

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4. June 2024 1H/Q1

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 1 is 3 marks)



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5. June 2024 1H/Q24

A polygon has n sides, where $n > 5$

The interior angles of the polygon form an arithmetic sequence.

The smallest angle of the polygon is 84°

The common difference of the sequence is 4°

Work out the sum of the interior angles of the polygon.

Show clear algebraic working.



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(Total for Question 24 is 6 marks)



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6. June 2024 1HR/Q23

Here are the first three terms of an arithmetic sequence.

$$(4x-14) , (x+2) , (7x-9)$$

Find, as an integer, the sum of the first 40 terms of the sequence.
Show clear algebraic working.



(Total for Question 23 is 4 marks)



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7. Nov 2023 1H/Q19

Here are the first 4 terms in an arithmetic sequence.

3 7 11 15

The last term of the sequence is x

The sum of the terms of the sequence is 7260

Find the value of x

Show clear algebraic working.



$x =$

(Total for Question 19 is 6 marks)



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8. June 2023 1H/Q20

The sum of the first 80 terms of an arithmetic series, S , is 470

The 75th term of S is 14.5

The sum of the first X terms of S is 171

Work out the value of X

Show your working clearly.

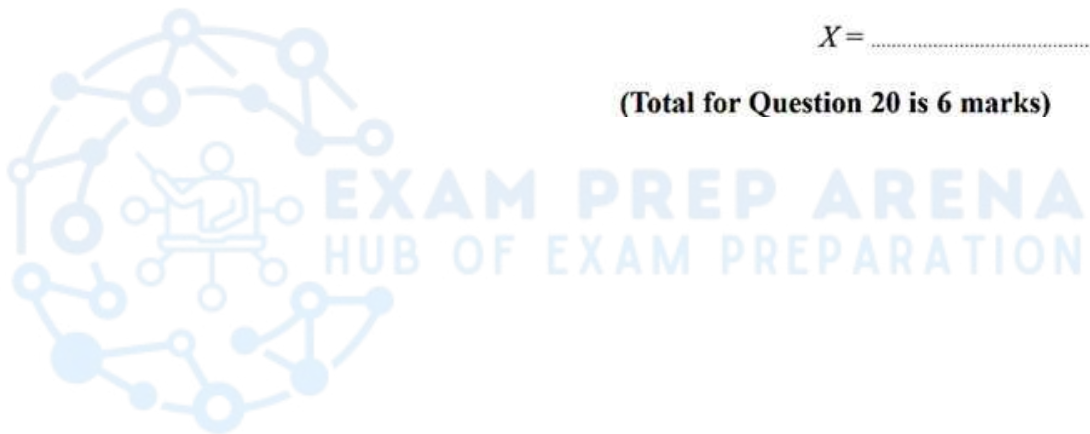


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$X =$

(Total for Question 20 is 6 marks)



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9. Jan 2023 1H/Q22

The first term of an arithmetic series is $(2t + 1)$ where $t > 0$

The n th term of this arithmetic series is $(14t - 5)$

The common difference of the series is 3

The sum of the first n terms of the series can be written as $p(qt - 1)^r$ where p , q and r are integers.

Find the value of p , the value of q and the value of r
Show clear algebraic working.

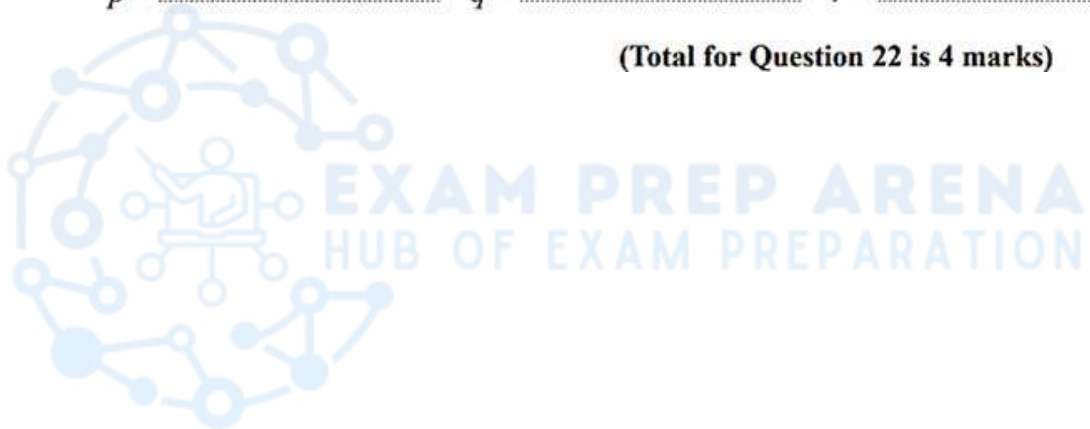


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$p = \dots\dots\dots$ $q = \dots\dots\dots$ $r = \dots\dots\dots$

(Total for Question 22 is 4 marks)



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 2 - SEQUENCES

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10. Jan 2023 1HR/Q24

An arithmetic sequence has first term 8 and common difference 11
The sequence has k terms, where $k > 21$

The sum of the last 20 terms of the sequence is 10 170

Find the value of k

Show clear algebraic working.



$k = \dots\dots\dots$

(Total for Question 24 is 5 marks)



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11. June 2022 1H/Q1

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 1 is 3 marks)



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12. June 2022 1H/Q23

A polygon has n sides, where $n > 5$

When arranged in order of size, starting with the largest number, the sizes of the interior angles of the polygon, in degrees, are the terms of an arithmetic sequence.

Here are the first five terms of this sequence.

177 175 173 171 169

Find the value of n

Show clear algebraic working.



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$n =$

(Total for Question 23 is 6 marks)



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13. June 2022 1HR/Q2

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.

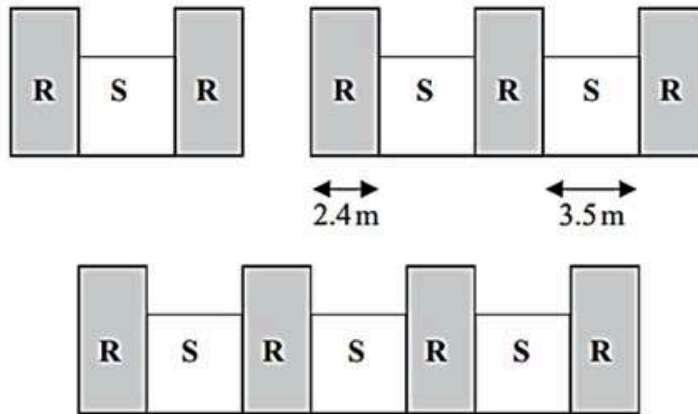


Diagram NOT accurately drawn

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.

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.

$W = \dots\dots\dots$ m
(2)

(Total for Question 2 is 4 marks)



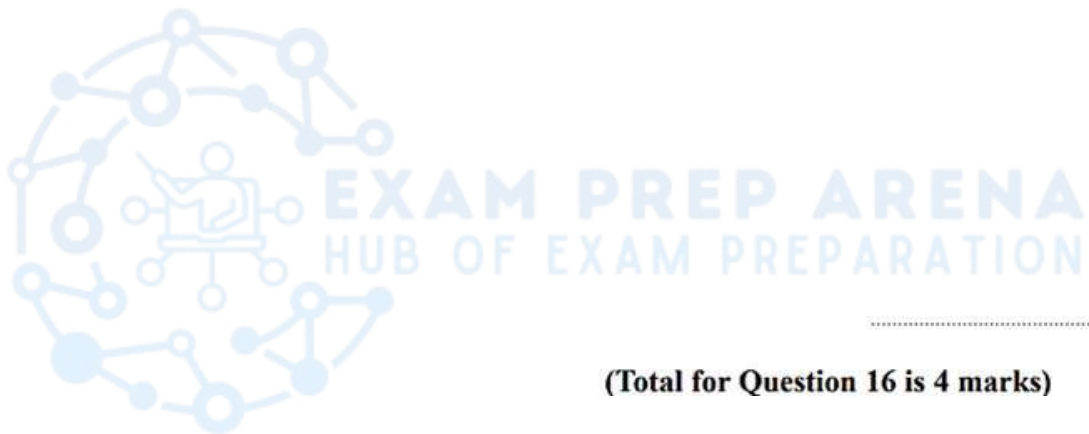
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14. Jan 2022 1HR/Q18

An arithmetic series has first term 1 and common difference 4

Find the sum of all terms of the series from the 41st term to the 100th term inclusive.



(Total for Question 16 is 4 marks)



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15. May 2021 1H/Q2

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 2 is 2 marks)



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16. May 2021 1H/Q23

The sum of the first N terms of an arithmetic series, S , is 292

The 2nd term of S is 8.5

The 5th term of S is 13

Find the value of N .

Show clear algebraic working.



$N = \dots\dots\dots$

(Total for Question 23 is 5 marks)



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 2 - SEQUENCES

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17. Jan 2021 1H/Q24

An arithmetic series has first term a and common difference d .

The sum of the first $2n$ terms of the series is four times the sum of the first n terms of the series.

Find an expression for a in terms of d .
Show your working clearly.



$a = \dots\dots\dots$

(Total for Question 24 is 4 marks)



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18. Jan 2021 1HR/Q21

The n th term of an arithmetic series is u_n where $u_n > 0$ for all n
The sum to n terms of the series is S_n

Given that $u_4 = 6$ and that $S_{11} = (u_6)^2 + 18$

find the value of u_{20}



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(Total for Question 21 is 6 marks)

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19. Nov 2020 1H/Q24

Here are the first five terms of an arithmetic sequence.

8 15 22 29 36

Work out the sum of all the terms from the 50th term to the 100th term inclusive.



.....
(Total for Question 24 is 4 marks)



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20. Nov 2020 1HR/Q18

In an arithmetic series, the 6th term is 39

In the same arithmetic series, the 19th term is 7.8

Work out the sum of the first 25 terms of the arithmetic series.



(Total for Question 18 is 4 marks)



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21. June 2019 1H/Q16

Here are the first five terms of an arithmetic sequence.

7 10 13 16 19

Find the sum of the first 100 terms of this sequence.

.....
(Total for Question 16 is 2 marks)



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22. June 2019 1HR/Q19

The 25th term of an arithmetic series is 44.5

The sum of the first 30 terms of this arithmetic series is 765

Find the 16th term of the arithmetic series.

Show your working clearly.



(Total for Question 19 is 5 marks)



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23. Jan 2019 1H/Q21

$(2x + 23)$, $(8x + 2)$ and $(20x - 52)$ are three consecutive terms of an arithmetic sequence.

Prove that the common difference of the sequence is 12



(Total for Question 21 is 4 marks)



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24. Jan 2019 1HR/Q12

Here are the first four terms of a sequence of fractions.

$$\frac{1}{1} \quad \frac{2}{3} \quad \frac{3}{5} \quad \frac{4}{7}$$

The numerators of the fractions form the sequence of whole numbers 1 2 3 4 ...

The denominators of the fractions form the sequence of odd numbers 1 3 5 7 ...

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

.....
(2)

(b) Using algebra, prove that when the square of any odd number is divided by 4 the remainder is 1

(3)

(Total for Question 12 is 5 marks)



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 2 - SEQUENCES

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25. June 2018 1HR/Q7

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 7 is 3 marks)



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 2 - SEQUENCES

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26. June 2018 1HR/Q23

Work out the sum of the multiples of 3 between 1 and 1000



(Total for Question 23 is 4 marks)



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EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 2 - SEQUENCES

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27. Sample 2018 1H/Q23

A , B and C are three towns.

The bearing of B from A is 105°

The bearing of C from B is 230°

The distance of C from A is 180 km.

The distance of C from B is 95 km.

Calculate the distance of B from A .

Give your answer correct to 3 significant figures.



..... km

(Total for Question 23 is 5 marks)



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 1 – HISTOGRAMS

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MARKING SCHEME

1. June 2025 1H/Q24

24	$123 = a + (20 - 1)d$ or $123 = a + 19d$		5	M1 for using $U_n = a + (n-1)d$
	$2880 = \frac{30}{2}(2a + (30-1)d)$ or $2880 = \frac{30}{2}(2a + 29d)$ or $192 = 2a + 29d$			M1 for using $S_n = \frac{n}{2}(2a + (n-1)d)$
	eg $192 = 2a + 29d$ $123 = a + 19d$ ($\times 2$) $246 = 2a + 38d$ Subtracting $54 = 9d$ or $192 = 2(123 - 19d) + 29d$ oe or $d = 6$	eg $192 = 2a + 29d$ ($\times 19$) $123 = a + 19d$ ($\times 29$) $3648 = 38a + 551d$ $3567 = 29a + 551d$ Subtracting $81 = 9a$ or $192 = 2a + 29\left(\frac{123-a}{19}\right)$ oe or $a = 9$		M1 (dep on M2) for a correct method to find a or d : coefficients of a or d the same in correct equations and correct operator to eliminate selected variable resulting in an equation in a only or in d only or writing a or d in terms of the other variable and correctly substituting (condone missing brackets)
	eg $192 = 2a + 29$ ("6") oe or $123 = a + 19$ ("6") oe	eg $192 = 2$ ("9") + $29d$ oe or $123 = $ "9" + $19d$ oe		M1 (dep on M3) for substituting their found value of a or d into a correct equation
	Working required	$a = 9$ $d = 6$		A1 dep on M2 a and d must be clearly identified
				Total 5 marks

2. June 2025 1HR/Q24

24	eg $(d =) (3y - 4) - (2x + 5) = (3y - 2x - 9)$ or $(2x + 5) + d = 3y - 4$ oe or $(d =) (4x - 2) - (3y - 4) = (4x - 3y + 2)$ or $(3y - 4) + d = (4x - 2)$ or $(2d =) (4x - 2) - (2x + 5) = (2x - 7)$ or $(2x + 5) + 2d = (4x - 2)$ oe		6	M1 for a correct expression or equation using the common difference, may be in terms of d for this mark we will allow an expression for $-d$ or $-2d$
	eg $216 = \frac{9}{2}[2(2x + 5) + (9-1)d]$ or $216 = \frac{9}{2}[2(2x + 5) + (9-1)(3y - 2x - 9)]$ or $216 = \frac{9}{2}[2(2x + 5) + (9-1)(4x - 3y + 2)]$ or $216 = \frac{9}{2}[2(2x + 5) + (9-1)(x - 3.5)]$ or $216 = \frac{9}{2}[2(2d + 3.5) + 5] + 8d]$			M1 for a correct equation for the sum of 9 terms in x and d or in terms of x and y or in terms of x or in terms of d for " $3y - 2x - 9$ " we will allow $(3y - 4) - (2x + 5)$ or for using their incorrect simplification from $(3y - 4) - (2x + 5)$ shown for " $4x - 3y + 2$ " we will allow $(4x - 2) - (3y - 4)$ or for using their incorrect simplification from $(4x - 2) - (3y - 4)$ shown similarly for their " $x - 3.5$ " and their " $d + 3.5$ "
	eg $6x - 6y = -11$ oe and $12y - 6x = 55$ oe or $6x - 6y = -11$ oe and $18x - 12y = 11$ oe or $2x - 2d = 7$ oe and $8d + 4x = 38$ oe	eg $d = x - 3.5$ oe and $48 = 12x - 18$ oe or $x = d + 3.5$ oe and $48 = 12d + 24$ oe or $d = 4.75 - 0.5x$ oe and $3x - 2 = 14.5$ oe		M2 left hand column 2 correct equations in terms of x and y in the form $px + qy = r$ oe or 2 correct equations in terms of x and d in the form $px + qd = r$ oe right hand column 2 correct equations in terms of x and y where one is substituted into the other to get a correct equation in the form $px + q = r$ or $py + q = r$ or 2 correct equations in terms of x and d where one is substituted into the other to get a correct equation in the form $px + q = r$ or $pd + q = r$ If not M2 then M1 for one correct equation in any of the required forms from <u>the left hand or right hand column</u>
	one equation must be from the differences and one equation must be from the sum of the terms			
	Working required	$x = \frac{11}{2}$ $y = \frac{22}{3}$		A2 (dep on M2) oe (allow 7.3(33...)) (A1 for $x = \frac{11}{2}$ or $y = \frac{22}{3}$)
				Total 6 marks



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 1 – HISTOGRAMS

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3. Nov 2024 1H/Q19

19	$\frac{30}{2}[2a+(30-1)d] = 4395$ or $30a + 435d = 4395$ or $2a + 29d = 293$		5	M1 for using $S_n = \frac{n}{2}[2a+(n-1)d]$
	$a+(10-1)d + a+(20-1)d = 284$ or $a+9d + a+19d = 284$ or $2a+28d = 284$ or $a+14d = 142$			M1 for using $U_n = a+(n-1)d$ correctly to form an equation
	eg $2a+29d = 293$ $- 2a+28d = 284$ $(d = 9)$	eg $28a+406d = 4102$ $- 29a+406d = 4118$ $((-) a = (-) 16)$		M1 dep on M2 for a correct method to eliminate a or d : coefficients of a or d the same and correct operator to eliminate selected variable (condone any one arithmetic error) or writing a or d in terms of the other variable and correctly substituting.
	$\frac{45}{2}[2(16)+(45-1)9]$			M1 dep on previous M1 for using $S_n = \frac{n}{2}[2a+(n-1)d]$ correctly with $a = 16$ and $d = 9$
	<i>Working required</i>	9630		A1 dep on M2
				Total 5 marks

4. Nov 2024 1H/Q19

1	(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



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 1 – HISTOGRAMS

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5. June 2024 1H/Q24

24	$\frac{n}{2}[2(84)+(n-1)(4)]$ or $\frac{n}{2}[168+4n-4]$ or $\frac{n}{2}[164+4n]$ oe or $82n+2n^2$ oe	6	M1 for correctly substituting into $S_n = \frac{n}{2}[2a+(n-1)d]$
	$\frac{n}{2}[2(84)+(n-1)(4)] = (n-2) \times 180$ or $\frac{n}{2}[164+4n] = (n-2) \times 180$ oe or $82n+2n^2 = (n-2) \times 180$ oe		M1 for equating S_n with $(n-2)180$ S_n must come from correct substitution of a and d into $\frac{n}{2}[2a+(n-1)d]$
	eg $n^2 - 49n + 180 = 0$ oe Allow $n^2 - 49n = -180$		M1 dep on M2 for multiplying out and collecting terms, forming a three term quadratic in any form of $an^2 + bn + c (= 0)$ where at least 2 coefficients (a or b or c) are correct
	eg $(n-45)(n-4) = 0$ $n = \frac{-(-49) \pm \sqrt{(-49)^2 - 4 \times 1 \times 180}}{2}$ e.g. $\left(n - \frac{49}{2}\right)^2 - \left(\frac{49}{2}\right)^2 = -180$		M1ft dep on M2 method to solve their 3 term quadratic using any correct method (allow one sign error and some simplification – allow as far as eg $\frac{49 \pm \sqrt{2401 - 720}}{2}$ or if factorising allow brackets which expanded give 2 out of 3 terms correct) or correct value for $n = 45$ (ignore $n = 4$)
	$(“45”-2) \times 180$ or $\frac{“45”}{2}[2(84)+(“45”-1)(4)]$ oe or $(“44”-2) \times 180$ or $\frac{“44”}{2}[2(84)+(“44”-1)(4)]$ oe		M1 dep on previous M1 NB $n > 5$
	<i>Working required</i>	7740	A1 dep on M5 Accept 7560 or 7480
			Total 6 marks

6. June 2024 1HR/Q23

23	$(7x-9)-(x+2) = (x+2)-(4x-14)$ oe eg $6x-11 = 16-3x$ OR $x+2 = 4x-14+d$ and $7x-9 = 4x-14+2d$ oe eg $-3x+16 = d$ and $3x+5 = 2d$	4	M1 for setting up an equation in x OR two simultaneous equations in x and d
	$x = 3$ and $a = -2$ and $d = 7$ OR $x = 3$ and eg $(S_{40}) = \frac{40}{2}[2(4x-14)+39(-3x+16)]$ or $x = 3$ and eg $(S_{40}) = \frac{40}{2}[2(4x-14)+39(6x-11)]$		M1 correct values or values from correct substitution OR $x = 3$ and S_{40} expressed in terms of x allow $(40-1)$ for 39
	$(S_{40}) = \frac{40}{2}(2 \times “-2” + 39 \times “7”)$ or eg $(S_{40}) = \frac{40}{2}[2(4 \times “3” - 14) + 39(-3 \times “3” + 16)]$ or $(S_{40}) = \frac{40}{2}[2(4 \times “3” - 14) + 39(6 \times “3” - 11)]$		M1 allow use of their a and their d or their x as long as clearly stated allow $(40-1)$ for 39
	<i>Working required</i>	5380	A1 (dep on M1)
			Total 4 marks



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 1 – HISTOGRAMS

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7. Nov 2023 1H/Q19

19	$a = 3$ and $d = 4$		6	M1 for a and d (can be embedded in the formula for S_n)
	$\frac{n}{2}[2(3) + (n-1)4] = 7260$ or $\frac{n}{2}(2 + 4n) = 7260$ oe	$\frac{n}{2}(3+x) = 7260$ and $x = 3 + (n-1)4$		M1 Allow $n = x$
	eg $4n^2 + 2n = 14520$ oe $2n^2 + n - 7260 (= 0)$ oe $8n^2 + 4n - 29040 (= 0)$ oe	eg $x^2 + 4x - 58077 = 0$ oe $x^2 + 4x = 58077$		M1 ft dep on previous M1 for forming a three term quadratic in any form of $ax^2 + bx + c (= 0)$ where at least 2 coefficients (a or b or c) are correct
	eg $(2n+121)(n-60) (= 0)$ eg $(n =) \frac{-1 \pm \sqrt{1^2 - 4 \times 2 \times -7260}}{4}$ eg $2 \left[\left(n + \frac{1}{4} \right)^2 - \left(\frac{1}{4} \right)^2 \right] = 7260$	eg $(x-239)(x+243) (= 0)$ eg $(x =) \frac{-4 \pm \sqrt{4^2 - 4 \times 1 \times -58077}}{2}$ eg $(x+2)^2 - (2)^2 = 58077$		M1 ft dep on previous M1 for a method to solve their 3 term quadratic using any correct method Allow one sign error and some simplification – allow as far as eg $\frac{-1 \pm \sqrt{1+58080}}{4}$ or $\frac{-4 \pm \sqrt{16+232308}}{2}$
	$(n =) 60$ (and $(n =) -60.5$) <i>Working required</i>	$(x =) 239$ (and $(x =) -243$)	239	A1 dep on M3 Ignore negative values A1 cao dep on M3 SCB2 if not shown clear algebraic working but give an answer of 239 (with method shown involving $a = 3$ and $d = 4$) as question asks for algebraic working. 239 alone gains zero marks
				Total 6 marks

8. June 2023 1H/Q20

20	$\frac{80}{2}(2a+79d) = 470$ oe $a + 74d = 14.5$ oe		6	M1 for substituting into the sum of arithmetic series formula
	correct method to find the value of a or d eg $2a + 148d = 29$ $2a + 79d = 11.75$			M1 for substituting into the n th term of arithmetic sequence formula
	correct values of $a = -4$ and $d = 0.25$ oe			M1 solve the correct equations simultaneously, eg make the coefficients of a or d the same and show the intention to subtract or rearrange one equation to make a or d the subject and substitute into the other equation
	$\frac{X}{2}(2 \times -4 + (X-1) \times 0.25) = 171$ oe			A1 dep on M2
	<i>Working required</i>	57		M1 correctly substituting the found values of a and d into a correct equation, can be their values of a and d as long as clearly stated
				A1 dep on M2
				Total 6 marks

9. Jan 2023 1H/Q22

22	$2t + 1 + (n-1)3 = 14t - 5$ $(n =) 4t - 1$ or $(n =) -1 + 4t$		4	M1 for the use of n th term $= a + (n-1)d$ to find n A1
	$(S_n =) \frac{4t-1}{2}[2(2t+1) + (4t-1-1)3]$ or $(S_n =) \frac{4t-1}{2}[2t+1+14t-5]$ oe			M1 for the use of S_n formula (must be in terms of t) Allow their expression for n dep on M1
	<i>Working required</i>	$p = 2$ $q = 4$ $r = 2$		A1 dep on M2 allow $(S_n =) 2(4t-1)^2$ Values of p, q and r must come from correct working
				Total 4 marks



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10. Jan 2023 1HR/Q24

24	$(S_{20} =) 10[2A + 19 \times 11] = 10170$ oe (where A is the $u_{(k-19)}$ th term)	5	M1
	$A = \left(\frac{10170}{10} - 19 \times 11 \right) \div 2 (= 404)$		M1
	$8 + (P-1)11 = "404"$ oe (where P is the number of terms from 20 to the end)		M1
	$P = \frac{"404" - 8 + 11}{11} (= 37)$		M1
	<i>Working required</i>	56	A1 dep on M1
	ALTERNATIVE METHOD		
	$(S_k =) \frac{k}{2}[2 \times 8 + (k-1)11]$ or $(S_{k-20} =) \frac{(k-20)}{2}[2 \times 8 + (k-21)11]$ or $(u_{k-19} =) 8 + 11(k-20)$ or $(u_k =) 8 + 11(k-1)$ (allow use of letter other than k)	5	M1 for S_k or S_{k-20} or u_k or u_{k-19} a and d must be substituted correctly
	$(S_k =) \frac{k}{2}[2 \times 8 + (k-1)11]$ and $(S_{k-20} =) \frac{(k-20)}{2}[2 \times 8 + (k-21)11]$ or $(u_{k-19} =) 8 + 11(k-20)$ and $(u_k =) 8 + 11(k-1)$		M1 For correct expressions for both S_k and S_{k-20} or u_k and u_{k-19}
	$10170 = \frac{k}{2}[2 \times 16 + (k-1)11] - \frac{(k-20)}{2}[2 \times 16 + (k-21)11]$ oe or $10170 = \frac{20}{2}([8 + 11(k-20)] + [8 + 11(k-1)])$ oe		M1
	eg $10170 = 160 + \frac{11}{2}[40k - 420]$ oe eg $440k = 24640$ or $2240 = 40k$ oe		M1 Expanding to obtain a linear equation and collecting terms in k
	<i>Working required</i>	56	A1 dep on M1
			Total 5 marks

11. June 2022 1H/Q1

1	(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 $6 \times m + 5$ or Allow $3(2n) + 5$ or $6n + 5$ oe
				Total 3 marks



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12. June 2022 1H/Q23

23	$d = -2$	6	M1 for common difference
	$(S_n =) \frac{n}{2} [2(177) + (n-1)(-2)]$ or $(S_n =) \frac{n}{2} [354 - 2n + 2]$ or $(S_n =) \frac{n}{2} [356 - 2n]$ oe		M1 for correctly substituting 177 and -2 into $(S_n =) \frac{n}{2} [2a + (n-1)d]$
	$\frac{n}{2} [2(177) + (n-1)(-2)] = (n-2) \times 180$		M1 dep on M2 for equating S_n with $(n-2) \times 180$
	E.g. $2n^2 + 4n - 720 = 0$ or $n^2 + 2n - 360 = 0$ oe Allow $n^2 + 2n = 360$		A1 (dep on M3) writing a correct 3-term quadratic expression in form $ax^2 + bx + c (= 0)$ allow $ax^2 + bx = c$
	E.g. $(x-18)(x+20)(= 0)$ $x = \frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times -360}}{2}$ e.g. $(x+1)^2 - (1)^2 = 360$		M1 (dep on M2) for a complete method to solve their 3-term quadratic equation Allow one sign error and some simplification – allow as far as $\frac{-2 \pm \sqrt{4 + 1440}}{2}$
		18	A1 dep on M3 for 18 only
			Total 6 marks

13. June 2022 1HR/Q2

2	(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 $(W =) 2.4n + 3.5(n-1)$		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

14. Jan 2022 1HR/Q16

16	$\frac{100}{2} [2 \times 1 + (100-1) \times 4] (= 19900)$ oe or $1 + (41-1) \times 4 (= 161)$ oe or $1 + (100-1) \times 4 (= 397)$ oe	4	M1 for method to find the sum of the first 100 terms or for finding the 41 st term or for finding the 100 th term
	$\frac{40}{2} (2 \times 1 + (40-1) \times 4) (= 3160)$ oe or $\frac{41}{2} (2 \times 1 + (41-1) \times 4) (= 3321)$ oe or $100 - 41 + 1 (= 60)$ oe		M1 for method to find the sum of the first 40 terms or 41 terms or for finding the number of terms from the 41 st term to the 100 th term
	$"19900" - "3160"$ or $\frac{"60"}{2} ["161" + "397"]$ or $\frac{"60"}{2} [2 \times "161" + ("60"-1) \times 4]$ oe		M1 for finding the difference or for finding the sum from the 41 st term to the 100 th term
		16740	A1
			Total 4 marks

15. May 2021 1H/Q2

2		$91 - 6n$	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 n th term = $91 - 6n$ but only B1 for $n = 91 - 6n$
			Total 2 marks



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 1 – HISTOGRAMS

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16. May 2021 1H/Q23

23	$a + d = 8.5, a + 4d = 13$ oe		5	M1	for at least 1 correct equation or for $d = 1.5$
	$a = 7, d = 1.5$			A1	both values correct
	$\frac{N}{2}(2 \times 7 + (N-1)1.5) = 292$ (eg $3N^2 + 25N - 1168 [= 0]$ or $1.5N^2 + 12.5N - 584 [= 0]$)			M1	A correct equation for the total of the first N terms of the series with a and d substituted in. The mark can be gained by using their values of a and d even if no previous marks awarded.
	eg $(3N + 73)(N - 16) [= 0]$ $[N =] \frac{-25 \pm \sqrt{25^2 - 4 \times 3 \times -1168}}{2 \times 3}$			M1	A correct method dep on the previous M1 for solving their 3 term quadratic equation using any correct method (allow one sign error and some simplification – allow as far as $\frac{-25 \pm \sqrt{625 + 14016}}{6}$) oe (may be \pm or just $+$) or if factorising, allow brackets which expanded give 2 out of 3 terms correct, or if completing the square allow as far as the stage $3((N + \frac{25}{6})^2 - \frac{25^2}{6^2}) - 1168 (= 0)$
	<i>Working required</i>	16		A1	dep on M2
Total 5 marks					

17. Jan 2021 1H/Q24

24	$\frac{2n}{2}[2a + (2n-1)d]$ oe		4	M1	for a correct expression for S_{2n}
	$\frac{2n}{2}[2a + (2n-1)d] = 4 \times \frac{n}{2}[2a + (n-1)d]$ oe			M1	dep on M1 for setting up a correct equation for $S_{2n} = 4 \times S_n$
	$2a - d = 4a - 2d$ oe			M1	for a correct linear expression in a and d
		$\frac{d}{2}$		A1	(dep on M2) for $\frac{d}{2}$ oe
Total 4 marks					

18. Jan 2021 1HR/Q21

21	E.g. $a + 3d = 6$ oe		6	M1	for forming an equation for the 4 th term of the sequence
	E.g. $\frac{11}{2}(2a + 10d) = (a + 5d)^2 + 18$			M1	for forming an equation for the sum of the first 11 terms of the sequence
	E.g. $a = 6 - 3d$ and $\frac{11}{2}[2(6 - 3d) + 10d] = (6 - 3d + 5d)^2 + 18$ or $d = \frac{6-a}{3}$ and $\frac{11}{2}[2a + 10(\frac{6-a}{3})] = (a + 5(\frac{6-a}{3}))^2 + 18$			M1	dep on M2 for a correct first step to solve the two equations (writing the equation in terms of one variable) Note: If $\frac{11}{2}(2a + 10d) = (a + 5d)^2 + 18$ is expanded then this must be a correct expansion E.g. $11a + 55d = a^2 + 10ad + 25d^2 + 18$
	E.g. $2d^2 + d - 6(= 0)$ oe or $2a^2 - 27a + 36(= 0)$ oe			A1	for a correct 3 term quadratic equation
	$d = 1.5$ oe and $a = 1.5$ oe			A1	for a correct value of d and a
		30		A1	cao
Total 6 marks					



EDEXCEL IGCSE MATHEMATICS MODULAR UNIT 1 – HISTOGRAMS

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19. Nov 2020 1H/Q24

24	$a = 8$ $d = 7$		4	M1 can be implied
	$(S_{100}) = \frac{100}{2}(2 \times 8 + (100 - 1) \times 7) (= 35\,450)$ or $(S_{49}) = \frac{49}{2}(2 \times 8 + (49 - 1) \times 7) (= 8624)$ or $(S_{50}) = \frac{50}{2}(2 \times 8 + (50 - 1) \times 7) (= 8975)$			M1
	'35450' - '8624' or '35450' - '8975' + $(8 + (50 - 1) \times 7)$			M1
		26 826		A1
				Total 4 marks
	Alternative scheme			
	$(u_n) = 7n + 1$	$a = 8$ and $d = 7$	4	M1 can be implied
	$(u_{50}) = 7 \times 50 + 1 (= 351)$ or $(u_{100}) = 7 \times 100 + 1 (= 701)$	$(u_{50}) = 8 + (50 - 1) \times 7$ (= 351)		M1
	$\frac{51}{2}('351' + '701')$	$\frac{51}{2}(2 \times 351 + (51 - 1) \times 7)$		M1
		26 826		A1
				Total 4 marks

20. Nov 2020 1HR/Q18

18	$a + 5d = 39$ or $a + 18d = 7.8$ or $13d = -31.2$ oe		4	M1
	$a = 51$ or $d = -2.4$			A1
	e.g. $\frac{25}{2}(2 \times 51 + (25 - 1) \times -2.4)$ oe or $12.5(2a + 23d + d) = 12.5(39 + 7.8 - 2.4)$ oe			M1 for substituting their values for a and d into S_n , a and d must be clearly stated.
		555		A1
				Total 4 marks

21. June 2019 1H/Q16

16	$a = 7$ and $d = 3$ $\frac{100}{2}(2 \times 7 + (100 - 1) \times 3)$ or 100th term is $7 + (100 - 1) \times 3 (= 304)$ and $100 \times (7 + "304") \div 2$ or 100th term is $3 \times 100 + 4 (= 304)$ and $100 \times (7 + "304") \div 2$		2	M1 for a method to find the sum - brackets $(100 - 1)$ must be used correctly
		15 550		A1
				Total 2 marks

22. June 2019 1HR/Q19

19	$a + 24d = 44.5$		5	M1 oe
	$\frac{30}{2}(2a + (30 - 1)d) = 765$ oe, eg $(15(2a + 29d) = 765)$, $(2a + 29d = 51)$, etc			M1 oe (may be simplified)
	e.g. $2(44.5 - 24d) + 29d = 51$ oe or $2a + 48d = 89$ $2a + 29d = 51$ oe			M1 dep on M2, a complete method to eliminate one variable, allow one arithmetic error
		26.5		A2 dep on M2, oe
				(A1) dep on M2. If not A2, award A1 for $a = -3.5$ or $d = 2$
				Total 5 marks



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23. Jan 2019 1H/Q21

Question	Working	Answer	Mark	Notes
21	<p>Mark scheme 1 (see next page for alternative mark scheme)</p> <p>$(8x + 2) - (2x + 23) (= 6x - 21)$ or $(2x + 23) - (8x + 2) (= -6x + 21)$ or $(20x - 52) - (8x + 2) (= 12x - 54)$ or $(8x + 2) - (20x - 52) (= -12x + 54)$</p> <p>$(8x + 2) - (2x + 23) = (20x - 52) - (8x + 2)$ oe or $(2x + 23) - (8x + 2) = (8x + 2) - (20x - 52)$ oe</p> <p>$x = 5.5$</p> <p>Eg $2 \times 5.5 + 23 (=34)$ and $8 \times 5.5 + 2 (=46)$ OR $8 \times 5.5 + 2 (=46)$ and $20 \times 5.5 - 52 (=58)$</p>	shown	4	<p>M1 for a correct expression for the common difference in terms of x brackets must be present or removed correctly</p> <p>M1 for a correct equation</p> <p>A1</p> <p>A1 for 12 from correct working</p>

24. Jan 2019 1HR/Q12

12	(a)	$\frac{n}{2n-1}$	2	M1 for $2n \pm k$ oe as the denominator
	(b)	Proved	3	A1 oe
		$(2n - 1)^2 = 4n^2 - 4n + 1$		M1 or $(2n + 1)^2 = 4n^2 + 4n + 1$ ft on $2n \pm k$ (k non zero)
		$4(n^2 - n) + 1$ or $\frac{4n^2 - 4n + 1}{4} = n^2 - n + \frac{1}{4}$		M1 or $4(n^2 + n) + 1$ or $\frac{4n^2 + 4n + 1}{4} = n^2 + n + \frac{1}{4}$
				A1 Conclusion

25. June 2018 1HR/Q7

7	(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				

26. June 2018 1HR/Q23

23	(First term = 3 and last term = 999) or $a = 3$ and $d = 3$	166 833	4	M1
	$999 \div 3 (= 333)$			M1 for finding the number of terms Allow $1000 \div 3 = 333.3 = 333$
	Sum = $\frac{333}{2}(3 + 999)$ or Sum = $\frac{333}{2}(2 \times 3 + (333 - 1)3)$			M1 for using a correct method to find the sum
				A1
Total 4 marks				

27. Sample 2018 1H/Q23

23	eg. diagram drawn showing relative positions of A , B and C can be implied by angle $ABC = 55^\circ$			M1 interprets information
	$\frac{\sin CAB}{95} = \frac{\sin 55}{180}$			M1
	$CAB = \sin^{-1}\left(\frac{95 \sin 55}{180}\right)$ or $CAB = 25.6(1\dots)$			M1 dep
	$AB = \frac{180}{\sin 55} \times \sin(180 - 55 - "25.6")$			M1 dep or for $\sqrt{180^2 + 95^2 - 2 \times 180 \times 95 \times \cos(180 - 55 - "25.6")}$
		217	5	A1
Total 5 marks				

