Mark schemes

Q1.

(a) 5, 9, 13, 17, 21 seen

allow one error or omission

M1

5 + 9 + 13 + 17 + 21 = 65

A1

(b) $4n + 1$

oe

B1 $4n$ (± k)

B2

Additional Guidance

$4 \times n + 1$ is B2

$4 \times n$ (+ k) is B1

[4]

Q2.

n and $n + 1$ seen

Two consecutive integers expressed algebraically, eg $n – 1$ and n

M1

$(n + 1)^2 – n^2$

Subtraction of their consecutive integers squared

M1dep

$n^2 + 2n + 1 – n^2$

Correct expansion

A1

$2n + 1$ and explanation why this expression must be odd

Strand (i). Explanation why their expression must be odd

Q1

[4]

Q3.

(a) −2, 1, 6

B1 for two correct terms

B2

(b) $8x − 5 − 1$

$2(ax + b) + 1 = 8x − 5$

or $2n + 1 = 8x − 5$

M1

$\frac{\text{their}(8x-5-1)}{2}$

2ax + 2b + 1 = 8x −5

or 2a = 8 and 2b + 1 = −5

or a = 4 and b = −3

M1

4x − 3

4x − 3

A1

[5]

Q4.

Alternative method 1

Second differences 8

Implied by $4n^2$

M1

Any three values from
–2 1 4 7

M1dep

$4n^2 + 3n - 5$

oe

Allow a = 4 b = 3 c = –5

A1

Alternative method 2

Any 3 of
$a + b + c = 2$
$4a + 2b + c = 17$
$9a + 3b + c = 40$
$16a + 4b + c = 71$

Using $an^2 + bn + c$

M1

Any 2 equations in 2 unknowns
e.g. $3a + b = 15$
$5a + b = 23$
$7a + b = 31$
$8a + 2b = 38$
$12a + 2b = 54$
$15a + 3b = 69$

Correctly eliminates the same letter using two different pairs of equations

M1dep

$4n^2 + 3n - 5$

oe

Allow $a = 4$ $b = 3$ $c = –5$

A1

Alternative method 3

Second differences 8
$a = 4$
or $c = 2 – 7$ or $– 5$

Using $an^2 + bn + c$

M1

$3a + b = 17 – 2$
and substitutes their a

oe e.g. $b = 3$

May also see $a + b + c = 2$ used to work out c

M1dep

$4n^2 + 3n – 5$

oe

Allow $a = 4$ $b = 3$ $c = –5$

A1

Additional Guidance

Sequence	(–5)	2	17	40	71
1st differences are	(7)	15	23	31	
2nd differences are		8	8	8	

[3]

Q5.

$(5n − 3)^2 + 1$

M1

$25n^2 − 15n − 15n + 9 + 1$

Allow one error

Must have an n^2 term

M1

$25n^2 − 30n + 10$

A1

$5(5n^2 − 6n + 2)$

oe

e.g. shows that all terms divide by 5 or explains why the expression is a multiple of 5

B1ft

Alternative method 1
Use of $an^2 + bn + c$ for terms of quadratic sequence

i.e. any one of
$a + b + c = 5$

$4a + 2b + c = 50$
$9a + 3b + c = 145$

M1

$3a + b = 45$

$5a + b = 95$

For eliminating c

M1

$25n^2 - 30n + 10$

A1

$5(5n^2 - 6n + 2)$

oe

e.g. shows that all terms divide by 5 or explains why the expression is a multiple of 5

B1ft

Alternative method 2

5 50 145 290

45 95 145

2nd difference of 50 ÷ 2 (= 25)

$25n^2$

M1

Subtracts their $25n^2$ from terms of sequence

−20 −50 −80

$-30n$

M1

$25n^2 - 30n + 10$

A1

$5(5n^2 - 6n + 2)$

oe

e.g. shows that all terms divide by 5 or explains why the expression is a multiple of 5

B1ft

[4]

Q6.

First **and** second differences correct

i.e. 4 6 8 (10)

2 2 (2)

M1

Correctly subtracts their $\frac{2}{2}n^2$ from given sequence

i.e. 10 11 12 (13 14)

M1

(1)n

dep on M2

M1dep

$n^2 + n + 9$

oe e.g. $n^2 + n + 10 - 1$

A1

Alternative method

Any three of

$a + b + c = 11$

$4a + 2b + c = 15$

$9a + 3b + c = 21$

$16a + 4b + c = 29$

$25a + 5b + c = 39$

Allow one error but each of their three equations must have a, b and c

M1

Eliminates one variable to obtain a pair of equations in two variables

e.g. $3a + b = 4$ **and**

$5a + b = 6$

Allow one error

M1

Eliminates one variable correctly

e.g. $2a = 2$

dep on M2

M1dep

$n^2 + n + 9$

oe e.g. $n^2 + n + 10 - 1$

A1

[4]

Q7.

1 4 9 16

B1

[1]