Question Number	Scheme	Marks
7.(a)	Attempts to use $4000 = 300 + 11d$ to find 'd'	M1
	Uses $300 + 3"d"$	M1
	Wheat production in year 4 is awrt 1310 (to the nearest 10) (tonnes)	A1
		(3)
(b)	Attempts to use $4000 = 300r^{11}$ to find 'r'	M1
	Finds $r = (1.266...)$ and MULTIPLIES this by 300	M1
	Wheat production in year 2 is awrt 380 (to the nearest 10) (tonnes)	A1
		(3)
(c)	Attempts $\frac{12}{2}\{300 + 4000\}$ or $\frac{300\left("1.266..."^{12} - 1\right)}{"1.266..." - 1}$	M1
	Finds $\frac{12}{2}\{300 + 4000\} - \frac{300\left("1.266..."^{12} - 1\right)}{"1.266..." - 1} = (25800 - 17935)$	dM1
	Difference = 7860 but allow 7870 (tonnes) (not AWRT)	A1
		(3)
		(9 marks)

Condone slips copying 300 and 4000 if they lose or gain an extra 0 in all parts

(a)

M1: Attempts to use the AP formula in an attempt to find 'd'
Accept an attempt at $4000 = 300 + 11d$ resulting in a value for d.
Accept the calculation $\frac{4000 - 300}{11}$ proceeding to a value (condoning slips)
May be implied by $\frac{3700}{11}$ or awrt 336

M1: Attempts to find the **fourth term** (do not allow a misread) by attempting $300 + 3 \times "336"$.
You may award this following an "incorrect" AP formula with $12d$ being used instead of $11d$. e.g.
$4000 = 300 + 12d$ or more likely $\frac{4000 - 300}{12}$ usually leading to an answer of 1225.
If no method seen to find d then it must be correct.

A1: awrt 1310 (**to the nearest 10**) (tonnes) isw once a correct answer is seen.

Alt (a)

M1: Forms the equation $\frac{x - 300}{4000 - 300} = \frac{4 - 1}{12 - 1}$ or may be implied by further work

M1: Rearranges the equation to $x = 300 + \frac{4 - 1}{12 - 1} \times (4000 - 300)$ or allow this mark for $x = 300 + \frac{4}{12} \times (4000 - 300)$

A1: awrt 1310 (**to the nearest 10**) (tonnes) isw once a correct answer is seen.

(b)

M1: Attempts to use the GP formula in an attempt to find 'r'

Look for $4000 = 300r^{11} \Rightarrow r^{11} = \frac{4000}{300} \Rightarrow r = \sqrt[11]{\frac{4000}{300}}$ condoning slips. Implied by r = awrt 1.3 provided they do not start from an incorrect equation.

M1: A correct attempt to find the **second term** (do not allow a misread) by multiplying 300 by their "1.266..." . It is dependent on an attempt to find r from either $4000 = 300r^{11}$ or $4000 = 300r^{12}$ condoning slips. If no method is seen to find r then it must be correct. e.g. following $4000 = 300r^{12}$ or $\sqrt[12]{\frac{4000}{300}}$.

Condone slips.

A1: awrt 380 (to the nearest 10) (tonnes) isw once a correct answer is seen.

(c) **Condone use of their *d* and their *r* even if they have come from incorrect methods**

M1: A correct method to find the sum of either the AP or the GP

For the AP accept an attempt at either $\frac{12}{2}\{300+4000\}$ or $\frac{12}{2}\{2\times 300+11\times "336"\}$

For the GP accept an attempt at either $\frac{300\left("1.266..."^{12}-1\right)}{"1.266..."-1}$ or $\frac{300\left(1-"1.266..."^{12}\right)}{1-"1.266..."}$

dM1: Both formulae must be attempted "correctly" (see above) and the difference taken

FYI if d and r are correct, the sums are 25 800 tonnes and 17 935

A1: Difference = 7860 or 7870 (tonnes) **This is NOT AWRT**.

(Note that use of $r = 1.266$ will lead to a difference of 7810 which is max M1dM1A0)

Alt (c) Listing values

Accept listing the values

M1: Attempts to add the 12 terms for the arithmetic or geometric series. Must include 300 and 4000, but condone one omission of one of the middle terms. May be implied by calculating the difference between the AP and GP values for each year and adding those together.

dM1: Attempts to add the 12 terms for the arithmetic and geometric series. Must include 300 and 4000 for both sums, but condone one omission of one of the middle terms in each of the summations. May be implied.

A1: Difference = 7860 or 7870 **This is NOT AWRT**.

Year	AP	GP	Difference
1	300	300	0
2	636.3636	379.6544	256.7093
3	972.7273	480.4582	492.2691
4	1309.091	608.0268	701.0641
5	1645.455	769.4668	875.9877
6	1981.818	973.7715	1008.047
7	2318.182	1232.322	1085.86
8	2654.545	1559.521	1095.024
9	2990.909	1973.597	1017.312
10	3327.273	2497.616	829.6567
11	3663.636	3160.77	502.8668
12	4000	4000	0
Sum	25800	17935.2	7864.796

Question Number	Scheme	Marks
8 (i)	Substitutes a value e.g. $n=6$ into n^2+3n+1 where n^2+3n+1 is **not prime**	M1
	Correct calculation for that value e.g $n^2+3n+1=55$ And conclusion "which is not prime"	A1
		(2)
(ii)	Attempts to find n^2-2 for either odds or evens E.g Attempts $(2p+1)^2-2$ or $(2p)^2-2$	M1
	Achieves either $(2p+1)^2-2=4p^2+4p-1$ or $(2p)^2-2=4p^2-2$ and shows or gives a reason why the expression is not a multiple of 4 where required (see notes)	A1
	Attempts to find n^2-2 for both odds and evens (See above)	dM1
	Achieves both $(2p+1)^2-2=4p^2+4p-1$ and $(2p)^2-2=4p^2-2$ and shows or gives reasons why these are not multiples of 4 where required (see notes) With a conclusion that they are not multiples of 4. *	A1*
		(4)
		(6 marks)

(i)

M1: Substitutes a value into n^2+3n+1 where n^2+3n+1 is not prime. (Does not have to be evaluated) Possible values are $n=6,11,13,16$ etc. Condone slips substituting in or if they have evaluated incorrectly provided the intention was to substitute in a valid value for *n*. (Note that $n=0$ is not acceptable)

A1: A correct calculation for the value and a conclusion. There must be some reference to not being prime or they show that the number is divisible by e.g. 5 and state that it is false/not true

e.g. $6^2+3\times6+1=55$ which is not prime (so not true) is M1A1

e.g. when $n=11$ then $n^2+3n+1=155$ $155\div5=31$ so false is M1A1

e.g. $6^2+3\times6+1=55$ so false is M1A0

Values of *n* up to 50 for which n^2+3n+1 is not prime:

n	n^2+3n+1	n	n^2+3n+1
6	55	31	1055
11	155	32	1121
13	209	33	1189
16	305	35	1331
17	341	36	1405
21	505	39	1639
22	551	41	1805
24	649	42	1891
26	755	46	2255
28	869	48	2449
		50	2651