1	(i)	(A)	$2A + D = 25$ oe	B1		condone lower-case a and d
			$4A + 6D = 250$ oe	B1		
			$D = 50$,	B1		
			$A = -12.5$ oe	B1		
				[4]		
1	(i)	(B)	$\dfrac{50}{2}\left(2 \times their A + 49 \times their D\right)$ [= 60 625] or $\dfrac{20}{2}\left(2 \times their\,A + 19 \times their\,D\right)$ [= 9250]	M1	or $a = $ their $A + 20D$	
			their "$S_{50} - S_{20}$"	M1	$S_{30} = \dfrac{30}{2}(a + l)$ oe with $l =$ their $A + 49D$	$S_{30} = \dfrac{30}{2}(2 \times their\,987.5 + 29 \times their\,50)$
			51 375 cao	A1		
				[3]		

1	(ii)	$\dfrac{a\left(r^2-1\right)}{r-1}=25$ or $\dfrac{a\left(r^4-1\right)}{r-1}=250$	B1		
		$\dfrac{a\dfrac{(r^4-1)}{r-1}}{a\dfrac{(r^2-1)}{(r-1)}}=\dfrac{250}{25}$ oe	M1		allow $a(1+r)$ as the denominator in the quadruple- decker fraction
		and completion to given result www		at least one correct interim step required	
		use of $r^4-1=(r^2-1)(r^2+1)$ to obtain $r^2+1=10$ www	M1	or multiplication and rearrangement of quadratic to obtain $r^4-10r^2+9=0$ oe with all three terms on one side	$r^2=x$ oe may be used

or **M1** for valid alternative algebraic approaches eg using $a(1+r)=25$ <u>and</u> $ar^2+ar^3=ar^2(1+r)=225$ |
		$r=\pm 3$	A1		or **B2** for all four values correct, **B1** for both r values or both a values or one pair of correct values if second **M** mark not earned
		$a=6.25$ or -12.5 oe	A1	or **A1** for one correct pair of values of r and a	
			[5]		

2			$\dfrac{b}{32} = \dfrac{12.5}{b}$ oe	M1	or $r^2 = 12.5/32$	
			$b = 20$	A1		
			$r = 0.625$ soi	A1		B3 for both r and b www; B2 for one of these
			$\dfrac{32\left(1 - 0.625^{15}\right)}{1 - 0.625}$ oe or ft their r	M1	M0 if directly summed, but B2 if correct answer obtained to 3 s.f. or better	
			85.259... to 3 s.f. or more	A1 **[5]**		
3			(i) $a + d = 11$ oe	M1*		
			$20(2a + 39d) = 3030$ oe	M1*		
			correct initial step in solving simultaneously	M1dep*	eg $20(2(11 - d) + 39d) = 3030$ oe,	may be implied by correct answers
			$d = 3.5$ oe	A1	SC1 if either of first two marks not awarded	mark to benefit of candidate
			$a = 7.5$ oe	A1 **[5]**	SC1 if either of first two marks not awarded	mark to benefit of candidate

4	$ar = 6$ and $ar^4 = -48$	**M1**	**B2** for $r = -2$ www	ignore incorrect lettering such as d =-2
	$r = -2$	**M1**		
	tenth term = 1536	**A1**	**B3** for 1536 www	
	$\dfrac{-3(1 - (-2)^n)}{1 - (-2)}$ o.e.	**M1**	allow **M1** for $a = 6 \div$ their r and substitution in GP formula with their a and r	condone the omission of the brackets round "-2" in the numerator and / or the denominator
	$(-2)^n - 1$	**A1**	c.a.o.	

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5	$a+2d = 24$ and $a + 9d = 3$	**M1** **A1**		
	$d = -3$; $a = 30$	**A1**	if **M0** , **B2** for either, **B3** for both	do not award **B2** or **B3** if values clearly obtained fortuitously
	$S_{50} - S_{20}$	**M1**		
			ft their a and d;	$S_{50} = -2175$; $S_{20} = 30$ $u_{21} = 30 - 20 \times 3 = -30$
	-2205 cao	**A1**	**M1** for $S_{30} = \dfrac{30}{2}(u_{21} + u_{50})$ o.e.	$u_{50} = 30 - 49 \times 3 = -117$
			B2 for -2205 www	

| 6 | (i) | 205 | 3 | M1 for AP identified with $d = 4$ and M1 for $5 + 50d$ used | 5 |
| | (ii) | $\dfrac{25}{3}$ o.e. | 2 | M1 for $r = \dfrac{2}{5}$ o.e. | |

7	(i) 54.5	2	B1 for $d = 2.5$	
	(ii) Correct use of sum of AP formula with $n = 50, 20, 19$ or 21 with their d and $a = 7$ eg $S_{50} = 3412.5$, $S_{20} = 615$	M1	or M2 for correct formula for S_{30} with their d M1 if one slip	
	Their $S_{50} - S_{20}$ dep on use of ap formula	M1		
	2797.5 c.a.o.	A1		5

8	$r = 1/3$ s.o.i. $a = 54$ or ft $18 \div$ their r $S = \dfrac{a}{1 - r}$ used with $-1 < r < 1$ $S = 81$ c.a.o.	2 M1 M1 A1	1 mark for $ar = 18$ and $ar^3 = 2$ s.o.i.	5

9	−0.2	3	M1 for $5 = \dfrac{6}{1 - r}$ and M1 dep for correct constructive step	3