14. The first three terms of an arithmetic series are p, $5p - 8$, and $3p + 8$ respectively.

(a) Show that $p = 4$.

(2)

(b) Find the value of the 40th term of this series.

(3)

(c) Prove that the sum of the first n terms of the series is a perfect square.

(3)

(Total 8 marks)

(Mark scheme is on next page)

14.	(a)	$(5p - 8) - p = (3p + 8) - (5p - 8)$	M1	
		Solve, showing steps, to get $p = 4$, or verify that $p = 4$. (*)	A1 c.s.o.	2
		<u>Alternative:</u> Using $p = 4$, finding terms (4, 12, 20), and indicating differences.	[M1]	
		Equal differences + conclusion (or "common difference = 8").	[A1]	
	(b)	$a = 4$ and $d = 8$ (stated or implied here or elsewhere).	B1	
		$T_{40} = a + (n - 1)d = 4 + (39 \times 8) = 316$	M1 A1	3
	(c)	$S_n = \frac{1}{2}n[2a + (n - 1)d] = \frac{1}{2}n[8 + 8(n - 1)]$	M1 A1ft	
		$= 4n^2 = (2n)^2$	A1	3
				[8]