2306
4PM1 Paper 2
Mark Scheme

Question	Scheme	Marks
1	$\dfrac{\left(a+2\sqrt5\right)}{\left(3-\sqrt5\right)}\times\dfrac{\left(3+\sqrt5\right)}{\left(3+\sqrt5\right)}=\dfrac{3a+a\sqrt5+6\sqrt5+10}{9-5}\left(=\dfrac{3a+10+\left(6+a\right)\sqrt5}{4}\right)$	M1
	$\left(\dfrac{3a+10+\left(6+a\right)\sqrt5}{4}=\dfrac{11+b\sqrt5}{2}\right)$ $\Rightarrow\dfrac{3a+10}{4}=\dfrac{11}{2}$ oe $\Rightarrow a=4\Rightarrow\dfrac{6+a}{4}=\dfrac{b}{2}$ oe $\Rightarrow b=5$	M1M1A1A1 [5]
	ALT $\left(\dfrac{\left(a+2\sqrt5\right)}{\left(3-\sqrt5\right)}=\dfrac{11+b\sqrt5}{2}\Rightarrow\right)2\left(a+2\sqrt5\right)=\left(3-\sqrt5\right)\left(11+b\sqrt5\right)$ $2a+4\sqrt5=33+3b\sqrt5-11\sqrt5-5b\left(=\left(33-5b\right)+\left(3b-11\right)\sqrt5\right)$	M1
	$\Rightarrow 4=3b-11\Rightarrow b=5$ $\Rightarrow 2a=33-5b\Rightarrow a=4$	M1M1A1A1 [5]
		Total 5 marks

Mark	Notes
M1	For multiplying both numerator & denominator of $\dfrac{\left(a+2\sqrt{5}\right)}{\left(3-\sqrt{5}\right)}$ through by $\dfrac{\left(3+\sqrt{5}\right)}{\left(3+\sqrt{5}\right)}$ to give $\dfrac{3a+a\sqrt{5}+6\sqrt{5}+10}{9-5}$. Allow one error on the numerator. The denominator must be correct.
M1	For correctly equating **their** coefficients with $\dfrac{11+b\sqrt{5}}{2}$. **Although this is not a dependent mark, there must be at least one equation in *a* and *b***
M1	For a complete and correct attempt to solve one of their equations to find a value for *a* **or** a value for *b*. **Although this is not a dependent mark, there must be at least one equation in *a* and *b*.**
A1	For either $a = 4$ or $b = 5$
A1	For both $a = 4$ and $b = 5$

Students may also multiply by $-3-\sqrt{5}$ This produces the correct answer and is the same as the main MS, but all the terms are negative. Mark to exactly the same principles.

ALT	
M1	Correctly removes the denominators from the given equation and multiplies out as shown to give the equation $2a+4\sqrt{5}=33+3b\sqrt{5}-11\sqrt{5}-5b$ Allow one error.
M1	For correctly equating **their** coefficients on either side of the equation. **Although this is not a dependent mark, there must be at least one equation in *a* and *b***
M1	For a correct and complete attempt to solve one of their equations to find a value for *a* **or** a value for *b*. **Although this is not a dependent mark, there must be at least one equation in *a* and *b***
A1	For either $a = 4$ or $b = 5$
A1	For both $a = 4$ and $b = 5$