Question number	Scheme	Marks
7(a)	$\dfrac{27^{(x+2)}-3^{(3x+5)}}{3^x\times 9^{(x+2)}}=\dfrac{3^{3(x+2)}-3^{(3x+5)}}{3^x\times 3^{2(x+2)}}$	M1A1
	$=\dfrac{3^{(3x+6)}-3^{(3x+5)}}{3^x\times 3^{(2x+4)}}=\dfrac{3^{3x}\times 3^6-3^{3x}\times 3^5}{3^{3x}\times 3^4},=\dfrac{3^{3x}\left(3^6-3^5\right)}{3^{3x}\times 3^4},\left(=\dfrac{486}{81}\right)=6$	dM1,ddM1,A1 (5)
	ALTs for last 3 marks	
ALT 1	$=\dfrac{3^{(3x+6)}-3^{(3x+5)}}{3^x\times 3^{(2x+4)}}=\dfrac{3^{3x}\times 3^6-3^{3x}\times 3^5}{3^{3x}\times 3^4},=\dfrac{3^{3x}\left(3^6-3^5\right)}{3^{3x}\times 3^4}=\dfrac{3^5(3-1)}{3^4},=6$	
(b)	$\log_y 2=\dfrac{\log_2 2}{\log_2 y}=\dfrac{1}{\log_2 y}$ or $\log_2 y=\dfrac{\log_y y}{\log_y 2}=\dfrac{1}{\log_y 2}$	M1
	Forming 3TQ:	
	$2\log_2 y+\dfrac{3}{\log_2 y}=7\Rightarrow 2\left(\log_2 y\right)^2+3=7\log_2 y$	dM1
	$2\left(\log_2 y\right)^2-7\log_2 y+3=0$ OR $2-7\log_y 2+3\left(\log_y 2\right)^2=0$	
	(Let $A=\log_2 y$)	
	$2A^2-7A+3=0\Rightarrow(2A-1)(A-3)=0\Rightarrow A=\dfrac{1}{2},3$	ddM1A1
	$\log_2 y=\dfrac{1}{2}\Rightarrow y=2^{\frac{1}{2}}(=\sqrt{2})$ $\log_2 y=3\Rightarrow y=2^3=8$	A1A1 (6)
		[11]

(a)

M1 Attempt to change power of 9 or 27 to a power of 3

A1 Correct unsimplified expression with powers of 3 alone

dM1 Expand brackets in the powers and write with all powers as single terms, depends on first M mark

ddM1 Remove common factor in numerator, depends on both previous M marks

A1 Correct value of k obtained (need not be written explicitly as $k = 6$)

(b)

M1 Change base. Can change to base 2 or base y or both terms to any other (same) base

dM1 Obtain a 3TQ Depends on the first M mark. Term can be in any order but must be 3 separate terms.

ddM1 Solve their 3TQ. Substitution shown not needed. Depends on both previous M marks.

A1 Correct values for $\log_2 y$ or A OR $\log_y 2$

A1 One correct value for y

A1 Second correct value for y