Question Number	Scheme	Notes	Marks
1(a)	$\left(2-\frac{x}{4}\right)^{10}=2^{10}+\binom{10}{1}2^9\left(-\frac{x}{4}\right)+\binom{10}{2}2^8\left(-\frac{x}{4}\right)^2+\binom{10}{3}2^7\left(-\frac{x}{4}\right)^3+\ldots$ Attempts the binomial expansion to get the third and/or fourth term with an acceptable structure. The correct binomial coefficient must be combined with the correct power of $\frac{x}{4}$ and the correct power of 2 but condone omission of brackets. You can ignore the signs between the terms and allow the terms to be listed. Allow for e.g. $\pm\binom{10}{2}2^8\left(\pm\frac{x}{4}\right)^2$ or $\pm{}^{10}C_3 2^7\left(\pm\frac{x}{4}\right)^3$ but condone omission of brackets. NB ${}^{10}C_2=45,\ {}^{10}C_3=120$ NB ${}^{10}C_2={}^{10}C_8$ and ${}^{10}C_3={}^{10}C_7$ **Alternative:** $\left(2-\frac{x}{4}\right)^{10}=2^{10}\left(1-\frac{x}{8}\right)^{10}=2^{10}\left(1-\frac{10x}{8}+\frac{10\times9}{2}\left(-\frac{x}{8}\right)^2+\frac{10\times9\times8}{3!}\left(-\frac{x}{8}\right)^3+\ldots\right)$ Score M1 for $2^{10}\left(\ldots\pm\frac{10\times9}{2}\left(-\frac{x}{8}\right)^2+\ldots\right)$ or $2^{10}\left(\ldots\pm\frac{10\times9\times8}{3!}\left(-\frac{x}{8}\right)^3+\ldots\right)$		M1
	$=1024-1280x+720x^2-240x^3$	$1024-1280x$	B1
		$720x^2$ **or** $-240x^3$	A1
		$720x^2$ **and** $-240x^3$	A1
	Note that if any of the "–"'s are "+ –"'s then penalise once on the first occurrence		
	Allow the terms to be listed e.g. $1024,-1280x,720x^2,-240x^3$ Apply isw once a correct answer is seen. Ignore any extra terms		
			(4)
(b)	$\left(3-\frac{1}{x}\right)^2=9-\frac{6}{x}+\frac{1}{x^2}$ or $9-\frac{3}{x}-\frac{3}{x}+\frac{1}{x^2}$	Correct expansion. May be implied by their work to find the constant.	B1
	$\left(3-\frac{1}{x}\right)^2\left(2-\frac{x}{4}\right)^{10}=\left(9-\frac{6}{x}+\frac{1}{x^2}\right)\left(1024-1280x+720x^2\left(-240x^3\right)+\ldots\right)$ constant term $=9\times1024-\frac{6}{x}\left(-1280x\right)+\frac{1}{x^2}720x^2$ This mark depends on having obtained an expression of the form $A+\frac{B}{x}+\frac{C}{x^2}$ for $\left(3-\frac{1}{x}\right)^2$ and at least a 3-term quadratic expression from part (a) so award for: $A\times"1024"+B\times"-1280"+C\times"720"$ A, B, C non-zero. Allow 1 sign error on their values. May be seen as part of a complete expansion but there must be an attempt to calculate the value of the constant term with the above conditions. For reference, true value calculation is: 9216 + 7680 + 720		M1
	= 17616	Correct value. Must be "extracted" if a complete expansion is found above.	A1
			(3)
			Total 7

Question Number	Scheme	Notes	Marks
2(a)	x | -0.25 | 0 | 0.25 | 0.5 | 0.75 y | 0.462 | **0.577** | 0.653 | **0.686** | 0.698 Allow awrt these values and look for the values appearing in the body of the script or within their calculation in part (b). Also allow exact value for the 0.577 e.g. $\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$		B1
			(1)
(b)	$h = 0.25$	Correct strip width. May be implied by $\frac{1}{8}$ or $\frac{1}{2}\times 0.25$	B1
	$A \approx \frac{1}{2}\times "0.25"\left\{0.462+0.698+2\left("0.577"+0.653+"0.686"\right)\right\}$ Correct application of the trapezium rule with their h Must be a correct application of the rule so e.g. $A \approx \frac{1}{2}\times "0.25"\times 0.462+0.698+2\left("0.577"+0.653+"0.686"\right)$ Scores M0 unless any missing brackets are implied by subsequent work. $A \approx \frac{1}{2}\times "0.25"\left\{0.462+0.698+2\left("0.577"+0.653+"0.686"\right)\right.$ Would also score M0 unless the closing bracket was implied by subsequent work Condone copying slips e.g. 0.426 instead of 0.462. Must use all the y-values. Repeated or missing y-values scores M0. Allow separate trapezia e.g. $A \approx \frac{1}{2}\times "0.25"\left(0.462+"0.577"\right)+\frac{1}{2}\times "0.25"\left("0.577"+0.653\right)+\frac{1}{2}\times "0.25"\left(0.653+"0.686"\right)+\frac{1}{2}\times "0.25"\left("0.686"+0.698\right)$ Allow use of the function e.g. $A \approx \frac{1}{2}\times 0.25\left\{\frac{2^{-0.25}}{\sqrt{5(-0.25)^2+3}}+\frac{2^{0.75}}{\sqrt{5(0.75)^2+3}}+2\left(\frac{2^{0}}{\sqrt{5(0)^2+3}}+\frac{2^{0.25}}{\sqrt{5(0.25)^2+3}}+\frac{2^{0.5}}{\sqrt{5(0.5)^2+3}}\right)\right\}$		M1
	= awrt 0.624 or $\frac{78}{125}$ oe e.g. $\frac{312}{500}$	accept awrt 0.624 or exact fraction but isw if necessary	A1
	Note that the calculator answer for the integral is 0.6265569683…		
			(3)
			Total 4