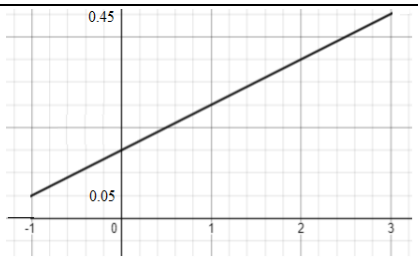
Question	Scheme	Marks
6(a)	$\int_{-1}^{3}(a+bx)\,\mathrm{d}x\,[=1]$ <u>or</u> trapezium drawn	M1
	$\left[ax+\frac{bx^2}{2}\right]_{-1}^{3}[=1]$ oe <u>or</u> $\frac{3-(-1)}{2}\big((a-b)+(a+3b)\big)[=1]$	A1
	$\left[3a+\frac{9b}{2}\right]-\left[-a+\frac{b}{2}\right]=1$ oe <u>or</u> $\frac{4}{2}(2a+2b)=1 \quad \Rightarrow 4a+4b=1^*$	A1*
		(3)
(b)(i)	$\int_{-1}^{3} ax^2+bx^3\,\mathrm{d}x=\left[\frac{ax^3}{3}+\frac{bx^4}{4}\right]_{-1}^{3}$	M1A1
	$\left[\frac{27a}{3}+\frac{81b}{4}\right]-\left[-\frac{a}{3}+\frac{b}{4}\right]=\frac{17}{5}$	dM1
	$\frac{28}{3}a+20\left(\frac{1-4a}{4}\right)=\frac{17}{5}$	M1 A1
		(5)
(ii)	$-\frac{32}{3}a=-\frac{8}{5}$ oe <u>or</u> $\frac{28}{3}\left(\frac{1-4b}{4}\right)+20b=\frac{17}{5}$	M1
	$b=\frac{1-4\times0.15}{4}\Rightarrow b=0.1^*$	A1*
		(2)
(c)		M1 A1
		(2)
(d)	$\left["0.15"k+\frac{0.1k^2}{2}\right]-\left[-"0.15"+\frac{0.1}{2}\right]=0.2$ <u>or</u> $\frac{1}{2}(k+1)(0.05+0.1k+0.15)=0.2$	M1
	$\left[0.45+\frac{0.9}{2}\right]-\left["0.15"k+\frac{0.1k^2}{2}\right]=0.8$ <u>or</u> $\frac{1}{2}(3-k)(0.15+0.1k+0.45)=0.8$	M1
	$0.05k^2+0.15k-0.1=0$	A1
	$k=\frac{-0.15\pm\sqrt{0.15^2-4\times0.05\times(-0.1)}}{2\times0.05}$	M1
	$=0.56155\ldots$ awrt **<u>0.562</u>**	A1
		(4)
		Total 16

	Notes	
(a)	**M1**	for an attempt to integrate $a+bx$ with either $a \to ax$ or $x \to x^2$ ignore limits or for trapezium drawn with parallel sides correct in terms of *a* and *b* (may be implied by correct area of trapezium)
	A1	correct integration or correct area of trapezium
	A1*	cso (correct limits seen substituted or correct area) equated to 1 which leads to final given answer
		Mark b(i) and b(ii) together
(b)(i)	**M1**	for an attempt to integrate ax^2+bx^3 with either $x^2 \to x^3$ or $x^3 \to x^4$ ignore limits
	A1	correct integration ignore limits
	dM1	dep on previous M1. Substituting in correct limits and equating to 17/5
	M1	substituting $4b=1-4a$ oe
	A1	a correct equation
(ii)	**M1**	solving their equation in *a* in the form $na=c$ where $n \neq 1$ or a correct equation in terms of *b* M0 for $a=0.15$ without working or for using $b = 0.1$ in $4a + 4b = 1$ to find *a*
	A1*	for a correct un-simplified expression for *b* leading to given answer $b = 0.1$ * which must come from correct working
(c)	**M1**	correct shape (straight line with positive gradient) must be above *x*-axis and must be between –1 and 3 ignore graph before –1 and after 3
	A1	correct with both correct *x*-axis labels –1 and 3 **and** at least 1 correct *y* –axis label from 0.05, 0.15 or 0.45 ignore graph before –1 and after 3
(d)	**M1**	for a correct equation using integration or area need not be simplified. use of limit $k + 1$ instead of *k* in integration is M0
	A1	correct 3 term quadratic (oe)
	M1	correct method seen to solve their 3 term quadratic or awrt 0.562 or awrt – 3.56
	A1	awrt 0.562 with other solutions eliminated if given Allow $\frac{\sqrt{17}-3}{2}$

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