Question Number	Scheme	Marks
7(a)	$\mathrm{f}(x)=[k]\left(a+3bx^2-4x^3\right)$	M1
	$[k]\left(6bx-12x^2\right)=0$	M1
	$9b-27=0\Rightarrow b=3$ or $6\times3\times1.5-12\times1.5^2=0\Rightarrow\therefore b=3$ *	A1*
		(3)
(b)	$a+3-1-4=0$ oe $[\Rightarrow a=2]$	B1*
		(1)
(c)	$k\left(2\times2+3\times2^3-2^4-4\right)=1 \quad \left[\Rightarrow k=\frac{1}{8}\right]$	M1
	F(x) = 0.5 / F(x) = 4 / F(x) = 0	
	F(1.4) = 0.3988… F(1.5) = 0.5078… / F(1.4) = 3.1904… F(1.5) = 4.0625… / F(1.4) = –0.8(096…) F(1.5) = 0.06(25…)	M1A1
	$0.399<0.5<0.508$ therefore, the median lies between 1.4 and 1.5 / $3.1904<4<4.0625$ therefore, the median lies between 1.4 and 1.5 / $-0.8(096)<0<0.06(25)$ therefore, the median lies between 1.4 and 1.5	A1
	ALTERNATIVE M1A1A1 for F(x) = 0	
	$x_1=2.91...$ $x_2=1.49...$ $x_3=-0.70...$ So x = 1.49… as $1\leqslant x\leqslant 2$	M1 A1
	$1.4<1.49...<1.5$ [therefore, the median lies between 1.4 and 1.5]	dA1
		(4)

	Notes	**Total 8**
(a)	**M1**	for attempting to differentiate $x^n\rightarrow x^{n-1}$ Condone missing k (May be implied by 2nd M1)
	M1	for correctly differentiating twice and equating to zero. Condone missing k
	A1*	substituting x = 1.5 leading to a correct linear equation in b leading to b = 3
(b)	**B1***	for correctly using F(1) = 0 to form an equation in a (May be seen in part (a)) and substitution of b = 3
(c)	**M1**	for using F(2) = 1 to form a correct equation in terms of k only. May be seen in any part of the question
	M1	For a calculation of F(1.4) **or** F(1.5) correct to 2 sf (If F(x) =0 used then allow 1 sf or better) (Allow F(1.4) = awrt 3.190k **or** F(1.5) = awrt 4.063k)
	A1	For a calculation of F(1.4) **and** F(1.5) correct to 2 sf (If F(x) =0 used then allow 1 sf or better)
	dA1	Dependent on previous A1. For a correct comparison and conclusion. Allow comparisons in words e.g. For F(X) = 0 a comment about a change in sign implies a comparison with 0
		ALTERNATIVE
	M1	For solving the given equation. May be implied by 2.91… or 1.49… or –0.70…
	A1	For x =1.49… identified as being in the range specified by the CDF. May be implied by rejecting the other solutions
	dA1	Dependent on previous A1. For a correct comparison and conclusion

Examples of other acceptable comparisons for 0.5
F(1.4) < 0.5 < F(1.5), Median lies between the range
F(1.4) < F(median) < F(1.5), so median lies between 1.4 and 1.5
F(1.4) < F(Q2) < F(1.5), therefore Q2 lies between 1.4 and 1.5
F(1.4) < F(m) < F(1.5), 1.4 < m < 1.5
F(1.4) < 0.5, F(1.5) > 0.5, so median of X lies between 1.4 and 1.5

Allow equivalent comparisons for 4 and 0

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom