Question Number	Scheme	Marks
5(a)	L~U[20,40] or $f(l)=\begin{cases}\frac{1}{20} & 20\le l\le 40\\ 0 & \text{otherwise}\end{cases}$	B1dB1
		(2)
(b)	$P(27.5<L<28.5)=\dfrac{28.5-27.5}{40-20}=\dfrac{1}{20}$ oe	M1A1
		(2)
(c)	$\left(\dfrac{L}{4}\right)^2<64=\left(\dfrac{L}{4}\right)<8$	M1
	$P(L<32)=\dfrac{32-20}{40-20}=0.6$ oe	M1A1
		(3)
(d)	$\left(\dfrac{L}{4}\right)^2-\left(\dfrac{40-L}{4}\right)^2>81\Rightarrow\left(\dfrac{-1600+80L}{16}\right)>81$	M1
	$L>36.2$	A1
	$P(L>"36.2")=\dfrac{40-"36.2"}{40-20}=0.19$ oe or $1-\dfrac{36.2-20}{40-20}=0.19$ oe	M1A1
		(4)

	Notes		Total 11
(a)	**B1**	For U[niform] or rectangular or f(l) = $\frac{1}{20}$	
	dB1	Dep on 1st B1 For [20, 40] or correct pdf fully specified. Must be seen in part (a)	
(b)	**M1**	for finding P(27.5 < L < 28.5) from a uniform distribution. May be implied by $\frac{1}{20}$	
	A1	Oe	
(c)	**M1**	for a correct expression for the area and comparison with 64 (allow equation or inequality) (may be implied by 32)	
	M1	using $P(L<32)$ with uniform distribution. May be implied by 0.6 oe	
	A1	Oe	
(d)	**M1**	a correct expression to find the difference between the two areas and comparison with 81 (allow equation or inequality) (may be implied by 36.2 oe) Condone $\left(\dfrac{40-L}{4}\right)^2-\left(\dfrac{L}{4}\right)^2>81$	
	A1	Oe e.g. $\frac{181}{5}$ (allow equation or inequality)	
	M1	using $P(L>"36.2")$ or $1-P(L<"36.2")$ with uniform distribution. Ft their 36.2	
	A1	Oe	

6. The continuous random variable X has probability density function $\mathrm{f}(x)$ given by

$$\mathrm{f}(x) = \begin{cases} \frac{1}{20}x^3 & 0 \leqslant x \leqslant 2 \\ \frac{1}{10}(6-x) & 2 < x \leqslant 6 \\ 0 & \text{otherwise} \end{cases}$$

(a) Sketch the graph of $\mathrm{f}(x)$ for all values of x

(3)

(b) Write down the mode of X

(1)

(c) Show that $\mathrm{P}(X > 2) = 0.8$

(2)

(d) Define fully the cumulative distribution function $\mathrm{F}(x)$

(4)

Given that $\mathrm{P}(X < a \mid X > 2) = \frac{5}{8}$

(e) find the value of $\mathrm{F}(a)$

(2)

(f) Hence, or otherwise, find the value of a. Give your answer to 3 significant figures.

(3)

(Total for Question 6 is 15 marks)