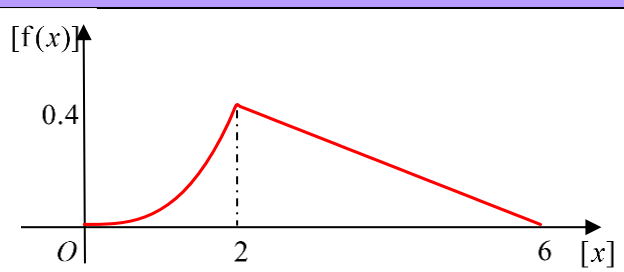
Question Number	Scheme	Marks
6(a)		B1B1B1
		(3)
(b)	[Mode] = 2	B1
		(1)
(c)	$[\mathrm{P}(X>2)=]\ \int_2^6 \frac{1}{10}(6-x)\mathrm{d}x$ or $\frac{1}{2}(6-2)(0.4)$ oe or $1-\int_0^2 \frac{1}{20}x^3\mathrm{d}x$	M1
	= 0.8*	A1*
		(2)
(d)	$\left[\mathrm{F}(x)=\int_0^x \frac{1}{20}t^3\mathrm{d}t=\right]\ \frac{1}{80}x^4\ ,\ 0\leqslant x\leqslant 2$	B1
	$[2<x\leqslant 6,\ \mathrm{F}(x)=]\ \int_0^2 \frac{1}{20}t^3\,\mathrm{d}t+\int_2^x \frac{1}{10}(6-t)\,\mathrm{d}t=0.2+\frac{1}{10}\left[6t-\frac{1}{2}t^2\right]_2^x$ or $\int\frac{1}{10}(6-x)\,\mathrm{d}x=\frac{1}{10}\left(6x-\frac{x^2}{2}\right)+c$ or $-\frac{1}{20}(6-x)^2$ with F(2) = 0.2 or F(6) = 1	M1
	$\mathrm{F}(x)=\begin{cases}0, & x<0\\ \frac{1}{80}x^4, & 0\leqslant x\leqslant 2\\ \frac{1}{10}\left(6x-\frac{1}{2}x^2-8\right), & 2<x\leqslant 6\\ 1, & x>6\end{cases}$	A1B1
		(4)
(e)	$\left[\mathrm{P}(X<a\mid X>2)=\frac{5}{8}\Rightarrow \mathrm{F}(a)=\right]\ \frac{5}{8}(0.8)+\text{"0.2"};\ =0.7$ or 0.5 + "0.2"; = 0.7	M1A1
		(2)
(f)	$\frac{1}{10}\left(6a-\frac{1}{2}a^2-8\right)=\text{"}\frac{7}{10}\text{"}$ or $1-\frac{1}{20}(6-a)^2=\text{"}\frac{7}{10}\text{"}$ or $\frac{1}{2}(6-a)\times\frac{1}{10}(6-a)=1-\text{"0.7"}$ or $\frac{(6-a)^2}{4^2}=\frac{1-\text{"0.7"}}{0.8}$	M1
	$\left[a^2-12a+30=0\Rightarrow\right]\ a=\frac{12\pm\sqrt{12^2-4(1)(30)}}{2}$ or $\left[(6-a)^2=6\Rightarrow\right]\ a=6\pm\sqrt{6}$	dM1
	$[a=3.5505102...\Rightarrow]\ a=3.55\ (3\,\mathrm{sf})$	A1
		(3)
	Notes	**Total 15**

(a)	**B1**	Correct shape with correct curvature. Must start at the x-axis
	B1	Straight line with negative gradient. Must end at the x-axis
	B1	2, 6 and 0.4 labelled in the correct place
(b)	**B1**	Cao
(c)	**M1**	A correct expression for P($X > 2$)
	A1*	Answer is given so no incorrect working can be seen
(d)	**B1**	2nd line of F(x) with correct limits. Condone use of < rather than $\leqslant$
	M1	For a complete method to find F(x) for $2 < x < 6$ **Either** attempt to integrate (at least one $t^n \rightarrow t^{n+1}$) both parts of f(t) with correct limits **or** with + c/d **and** uses F(2) = 0.2 or F(6) = 1
	A1	3rd line of F(x) with correct limits May be written as $1-\frac{1}{20}(6-x)^2$ Condone use of $\leqslant$ rather than <
	B1	1st and 4th line of F(x) with correct limits (Allow otherwise for one of these two limits) Condone use of $\leqslant$ rather than < or $\geqslant$ rather than >
(e)	**M1**	For [F(a)] = $\frac{5}{8}(0.8)$ + their F(2) oe or 0.5 + their F(2) = [F(a)] oe May be implied by F(a) = 0.7
	A1	0.7 oe
(f)	**M1**	Setting the 3rd line of their F(x) equal to their answer to part (e) or finding the area of the right hand triangle and setting = 1 – their part (e) or using the square of ratio of areas equal to the ratio of sides
	dM1	Dep on 1st M1 for solving a 3TQ (If the 3TQ is incorrect then working must be shown)
	A1	For 3.55 (Allow awrt 3.55)

7. Members of a conservation group record the number of sightings of a rare animal. The number of sightings follows a Poisson distribution with a rate of 1 every 2 months.

(a) Find the smallest value of n such that the probability that there are at least n sightings in 2 months is less than 0.05

(2)

(b) Find the smallest number of months, m, such that the probability of no sightings in m months is less than 0.05

(2)

(c) Find the probability that there is at least 1 sighting per month in each of 3 consecutive months.

(3)

(d) Find the probability that the number of sightings in an 8 month period is equal to the expected number of sightings for that period.

(2)

(e) Given that there were 4 sightings in a 4 month period, find the probability that there were more sightings in the last 2 months than in the first 2 months.

(3)

(Total for Question 7 is 12 marks)