Question Number	Scheme	Marks
5. (a)	$P(X<7) = P\left(Z < \frac{7-10}{6}\right) = P(Z<-0.5)$	M1
	$= 1 - 0.6915$; $= 0.308537\ldots$ awrt **0.309**	M1; A1 (3)
(b)	$\frac{10+k-10}{6} = 0.8416$	M1 B1
	$k = 5.0496$ awrt **5.05**	A1 (3)
(c)	Area of rectangle is $X(X-3)$	M1
	Need $X(X-3) > 40$	M1
	$X^2 - 3X - 40 > 0 \Rightarrow (X-8)(X+5) > 0$	M1
	So critical values are 8 and -5	A1
	Need $P(X>8) + P(X<-5)$ or $1 - P(-5<X<8)$	M1
	So $P(Z>-0.33) + P(Z<-2.5)$	M1
	$= 0.6293 + 0.0062$	dM1
	$= 0.6355$ $[0.6355 \sim 0.637]$	A1 (8) **[14]**

	Notes
(a)	1st M1 for standardising 7 (or 13) with 10 and 6 (allow $\pm$)
	2nd M1 for $1-p$ (where $0.68 < p < 0.70$)
	A1 for awrt 0.309 (calc. 0.3085375……) (**Ans only** scores 3/3)
(b)	M1 Standardising $10 \pm k$ with 10 and 6 and setting equal to z value $0.8 < \lvert z \rvert < 0.9$
	B1 for $z = \pm 0.8416$ or better (calc gives 0.8416212…..) used in a linear equation for k
	A1 $k = 5.05$ or better (or use of $z = 0.84$ and answer of 5.04)
Ans only	awrt 5.04 scores M1B0A1
Ans only	Answer in the range 5.049 ~ 5.0499 scores M1B1A1 but answer only of 5.05 is M1B0A1
(c)	1st M1 for a suitable expression for the area of the rectangle (in x or X) [$\Rightarrow$ by 2nd or 3rd M1]
	2nd M1 for a correct quadratic inequality (accept $x(x-3) > 40$ [o.e.])
	3rd M1 for an attempt to solve their 3TQ to find critical values (allow = 0) (e.g. factorise)
	Allow $(X+8)(X-5)$ or use of formula with $\leqslant 1$ sign error or $\left(X - \frac{3}{2}\right)^2 - k - 40$ ($k>0$)
	1st A1 for the correct critical values (cvs) of 8 and -5
	4th M1 for solving their quadratic inequality - taking the "outside" region (ft their cvs) [P(..) not required]
	5th M1 for standardising at least one of their values (with 10 and 6) correctly (ft their cvs)
	6th dM1 for an attempt at both probabilities: one ≈ 0.006 and one > 0.6 **and adding** or for $1-q$ where $q = 0.36$ or better. This mark is dependent on all the other 5 M marks being scored
	2nd A1 for answer in range [0.6355, 0.637] with clear attempt at both probabilities used (calc 0.636768…)
Ans only	If 6th M1 is not explicitly seen then must have an answer awrt 0.636 or 0.637