1. A rectangle has a perimeter of 20 cm. The length, x cm, of one side of this rectangle is uniformly distributed between 1 cm and 7 cm.

Find the probability that the length of the longer side of the rectangle is more than 6 cm long.

(Total 5 marks)

2. The three independent random variables A, B and C each has a continuous uniform distribution over the interval [0, 5].

(a) Find $P(A > 3)$.

(1)

(b) Find the probability that A, B and C are all greater than 3.

(2)

The random variable Y represents the maximum value of A, B and C.

The cumulative distribution function of Y is

$$F(y) = \begin{cases} 0 & y < 0 \\ \dfrac{y^3}{125} & 0 \le y \le 5 \\ 1 & y > 5 \end{cases}$$

(c) Find the probability density function of Y.

(2)

(d) Sketch the probability density function of Y.

(2)

(e) Write down the mode of Y.

(1)

(f) Find $E(Y)$.

(3)

(g) Find $P(Y > 3)$.

(2)
(Total 13 marks)

3. The continuous random variable X is uniformly distributed over the interval $[-2, 7]$.

(a) Write down fully the probability density function $f(x)$ of X.

(2)

(b) Sketch the probability density function $f(x)$ of X.

(2)

Find

(c) $E(X^2)$,

(3)

(d) $P(-0.2 < X < 0.6)$.

(2)
(Total 9 marks)

4. Jean regularly takes a break from work to go to the post office. The amount of time Jean waits in the queue to be served at the post office has a continuous uniform distribution between 0 and 10 minutes.

(a) Find the mean and variance of the time Jean spends in the post office queue.

(3)

(b) Find the probability that Jean does not have to wait more than 2 minutes.

(2)

Jean visits the post office 5 times.

(c) Find the probability that she never has to wait more than 2 minutes.

(2)

Jean is in the queue when she receives a message that she must return to work for an urgent meeting. She can only wait in the queue for a further 3 minutes.

Given that Jean has already been queuing for 5 minutes,

(d) find the probability that she must leave the post office queue without being served.

(3)
(Total 10 marks)

5. A string *AB* of length 5 cm is cut, in a random place *C*, into two pieces. The random variable X is the length of *AC*.

(a) Write down the name of the probability distribution of X and sketch the graph of its probability density function.

(3)

(b) Find the values of E(X) and Var(X).

(3)

(c) Find P(X >3).

(1)

(d) Write down the probability that *AC* is 3 cm long.

(1)
(Total 8 marks)

6. The continuous random variable L represents the error, in mm, made when a machine cuts rods to a target length. The distribution of L is continuous uniform over the interval [–4.0, 4.0].

Find

(a) $P(L < -2.6)$,

(1)

(b) $P(L < -3.0 \text{ or } L > 3.0)$.

(2)

A random sample of 20 rods cut by the machine was checked.

(c) Find the probability that more than half of them were within 3.0 mm of the target length.

(4)
(Total 7 marks)

7. The random variable X is uniformly distributed over the interval [–1, 5].

(a) Sketch the probability density function f(x) of X.

(3)

Find

(b) E(X)

(1)

(c) Var(X)

(2)

(d) $P(-0.3 < X < 3.3)$

(2)
(Total 8 marks)

8. The continuous random variable X is uniformly distributed over the interval [2, 6].

(a) Write down the probability density function f(x).

(2)

Find

(b) E(X),

(1)

(c) Var(X),

(2)

(d) the cumulative distribution function of X, for all x,

(4)

(e) P($2.3 < X < 3.4$).

(2)
(Total 11 marks)

9. A rod of length $2l$ was broken into 2 parts. The point at which the rod broke is equally likely to be anywhere along the rod. The length of the **shorter** piece of rod is represented by the random variable X.

(a) Write down the name of the probability density function of X, and specify it fully.

(3)

(b) Find P($X < \frac{1}{3}l$).

(2)

(c) Write down the value of E(X).

(1)

Two identical rods of length $2l$ are broken.

(d) Find the probability that both of the shorter pieces are of length less than $\frac{1}{3}l$.

(2)
(Total 8 marks)

10. The continuous random variable X is uniformly distributed over the interval $[-1, 4]$.

Find

(a) P($X < 2.7$),

(1)

(b) E(X),

(2)

(c) Var (X).

(2)
(Total 5 marks)

11. A drinks machine dispenses lemonade into cups. It is electronically controlled to cut off the flow of lemonade randomly between 180 ml and 200 ml. The random variable X is the volume of lemonade dispensed into a cup.

(a) Specify the probability density function of X and sketch its graph.

(4)

(b) Find the probability that the machine dispenses

(i) less than 183 ml,

(ii) exactly 183 ml.

(3)

(c) Calculate the inter-quartile range of X.

(1)

(d) Determine the value of x such that $P(X \geq x) = 2P(X \leq x)$.

(3)

(e) Interpret in words your value of x.

(2)
(Total 13 marks)

12. An engineer measures, to the nearest cm, the lengths of metal rods.

(a) Suggest a suitable model to represent the differences between the true lengths and the measured lengths.

(2)

(b) Find the probability that for a randomly chosen rod the measured length will be within 0.2 cm of the true length.

(2)

Two rods are chosen at random.

(c) Find the probability that for both rods the measured lengths will be within 0.2 cm of their true lengths.

(2)
(Total 6 marks)

13. The continuous random variable X represents the error, in mm, made when a machine cuts piping to a target length. The distribution of X is rectangular over the interval [–5.0, 5.0].

Find

(a) P(X < – 4.2),

(1)

(b) P($|X|$ < 1.5).

(2)

A supervisor checks a random sample of 10 lengths of piping cut by the machine.

(c) Find the probability that more than half of them are within 1.5 cm of the target length.

(3)

If X < – 4.2, the length of piping cannot be used. At the end of each day the supervisor checks a random sample of 60 lengths of piping.

(d) Use a suitable approximation to estimate the probability that no more than 2 of these lengths of piping cannot be used.

(5)
(Total 11 marks)

1. Method 1

$P(X > 6) = \frac{1}{6}$	B1 M1
$P(X < 4) = \frac{1}{2}$	A1
$\text{total} = \frac{1}{6} + \frac{1}{2} = \frac{2}{3}$	M1dep B A1 5

–

Note

B1 for 6 and 4 (allow if seen on a diagram on *x*-axis)
M1 for P(X > 6) or P(6 < X < 7); or P(X < 4) or P(1 < X < 4) ; or P(4 < X < 6) Allow ≤ and ≥ signs

A1 $\frac{1}{6}$; *or* $\frac{1}{2}$; $\frac{1}{3}$ must match the probability statement

M1 for adding their "P(X > 6)" and their "P(X < 4)" or 1 – their "P(4 < X < 6)" dep on getting first B mark

A1 cao $\frac{2}{3}$

Method 2

$P(4 < X < 6) = \frac{1}{3}$	B1 M1
$1 - \frac{1}{3} = \frac{2}{3}$	M1dep B A1 5

–

Note

B1 for 6 and 4 (allow if seen on a diagram on *x*-axis)
M1 for P(X > 6) or P(6 < X < 7); or P(X < 4) or P(1 < X < 4) ; or P(4 < X < 6) Allow ≤ and ≥ signs

A1 $\frac{1}{6}$; *or* $\frac{1}{2}$; $\frac{1}{3}$ must match the probability statement

M1 for adding their "P(X > 6)" and their "P(X < 4)" or 1 – their "P(4 < X < 6)" dep on getting first B mark

A1 cao $\frac{2}{3}$

Method 3

$P(X > 6) = \frac{1}{6}$ B1 M1

$Y \sim U[3, 9]$ $P(Y > 6) = \frac{1}{2}$ A1

total = $\frac{1}{6} + \frac{1}{2} = \frac{2}{3}$ M1dep B A1 5

Note

B1 for 6 with U[1, 7]and 6 with U[3, 9]
M1 for $P(X > 6)$ or $P(6 < X < 7)$ or $P(6 < Y < 9)$

A1 $\frac{1}{6}$; *or* $\frac{1}{2}$ or must match the probability statement

M1 for adding their "$P(X > 6)$" and their "$P(Y > 6)$" dep on getting first B mark

A1 cao $\frac{2}{3}$

[5]

2. (a) $P(A > 3) = \frac{2}{5} = 0.4$ B1 1

Note

B1 correct answer only(cao). Do not ignore subsequent working

(b) $(0.4)^3$, = 0.064 or $\frac{8}{125}$ M1 A1 2

Note

M1 for cubing their answer to part (a)

A1 cao

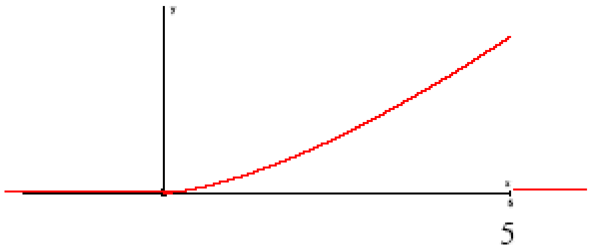
(c) $$f(y) = \frac{d}{dy}(F(y)) = \begin{cases} \dfrac{3y^2}{125} & 0 \le y \le 5 \\ 0 & \textit{otherwise} \end{cases}$$ M1A1 2

Note

M1 for attempt to differentiate the cdf. They must decrease the power by 1

A1 fully correct answer including 0 otherwise. Condone < signs

(d)



Shape of curve and start at (0,0) B1

Point (5, 0) labelled and curve between 0 and 5 and pdf $\geq$ 0 B1 2

Note

B1 for shape. Must curve the correct way and start at (0,0). No need for $y = 0$ (patios) lines

B1 for point (5,0) labelled and pdf only existing between 0 and 5, may have $y = 0$ (patios) for other values

(e) Mode = 5 B1 1

Note

B1 cao

(f) $$\mathrm{E}(Y) = \int_0^5 \left(\frac{3y^3}{125}\right) dy = \left[\frac{3y^4}{500}\right]_0^5 = \frac{15}{4} \text{ or } 3.75$$ M1M1A1 3

Note

1st M1 for attempt to integrate their $y\mathrm{f}(y)$ $y^n \rightarrow y^{n+1}$.

2nd M1 for attempt to use correct limits

A1 cao

(g) $\mathrm{P}(Y>3)=\begin{cases}\int_3^5 \frac{3y^2}{125}\,\mathrm{d}y \\ \text{or } 1-\mathrm{F}(3)\end{cases} = 1-\frac{27}{125}=\frac{98}{125}=0.784$ M1A1 2

<u>Note</u>

M1 for attempt to find P(Y > 3).

e.g. writing $\int_3^5 \textit{their } f(y)$ must have correct limits

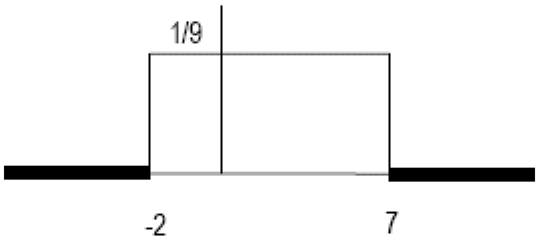
or writing 1 – F(3)

[13]

3. (a) f (x) = $\begin{cases}\frac{1}{9} & -2\le x\le 7\\ 0 & \textit{Otherwise}\end{cases}$ B1

B1 2

(b)



B1
B1 2

(c) E(X) = <u>2.5</u> Var (X) = $\frac{1}{12}(7+2)^2$ or <u>6.75</u> both B1

E (X^2) = Var (X) + E(X)^2 M1

= 6.75 + 2.5^2

= 13 A1 3

alternative

$\int_{-2}^{7} x^2\ f(x)dx = \left[\frac{x^3}{27}\right]_{-2}^{7}$ $\int x^2 f(x)$" B1

attempt to integrate and use limits of - 2 and 7 M1

= 13 A1

(d)	$P(-0.2 < X < 0.6) = \frac{1}{9} \times 0.8$		M1	
	$= \frac{4}{45}$ or 0.0889 0r equiv	awrt 0.089	A1	2

[9]

4. (a) $E(X) = 5$ — B1

$\text{Var}(X) = \frac{1}{12}(10-0)^2$ or attempt to use $\int \frac{x^2}{10}\mathrm{d}x - \mu^2$ — M1

$= \frac{100}{12} = \frac{25}{3} = 8\frac{1}{3} = 8.\dot{3}$ awrt 8.33 — A1 3

B1 cao

M1 using the correct formula $\frac{(a-b)^2}{12}$ and subst in 10 or 0
or for an attempt at the integration they must increase the power of x by 1 and subtract their E(X) squared.
A1 cao

(b) $P(X \le 2) = (2-0)\times\frac{1}{10} = \frac{1}{5}$ or $\frac{2}{10}$ or 0.2 — M1A1 2

M1 for $P(X \le 2)$ or $P(X < 2)$
A1 cao

(c) $\left(\frac{1}{5}\right)^2 = 0.00032$ or $\frac{1}{3125}$ or 3.2×10^{-4} o.e. — M1A1 2

M1 (their b)^5. If the answer is incorrect we must see this.
No need to check with your calculator
A1 cao

(d) P(X ≥ 8) or P(X > 8)

$$P(X \geq 8 \mid X \geq 5) = \frac{P(X \geq 8)}{P(X \geq 5)}$$ M1 M1

$$= \frac{2/10}{5/10}$$

$$= \frac{2}{5}$$ A1 3

alternative

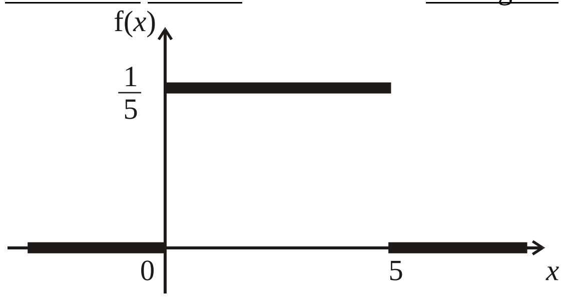
remaining time ~ U[0, 5] or U[5, 10] $P(X \geq 3 \text{ or } 8) = \frac{2}{5}$ M1A1A1

writing P(X ≥ 8) (may use > sign). If they do not write P(X ≥ 8) then it must be clear from their working that they are finding it.
0.2 on its own with no working gets M0
M1 For attempting to use a correct conditional probability.
NB this is an A mark on EPEN
A1 2/5 Full marks for 2/5 on its own with no incorrect working

Alternative
M1 for P(X ≥ 3) or P(X ≥ 8) may use > sign
M1 using either U[0, 5] or U[5, 10]
A1 2/5

[10]

5. (a) <u>Continuous</u> <u>uniform</u> distribution *or* <u>rectangular</u> distribution. B1



1/5,(0)*,5 *0 may be implied by start at y axis B1

____ ____ ____ B1 3

	(b)	$E(X) = 2.5$	ft from their a and b, must be a number	B1ft	
		$\text{Var}(X) = \frac{1}{12}(5-0)^2$		M1	
		or attempt to use $\int_0^5 f(x)x^2 dx - \mu^2$ use their f(x)			
		$= \frac{25}{12}$ or 2.08 0.e.	awrt 2.08	A1	3
	(c)	$P(X > 3) = \frac{2}{5} = 0.4$	2 times their 1/5 from diagram	B1ft	1
	(d)	$P(X = 3) = 0$		B1	1

[8]

6.	(a)	$P(L < -2.6) = 1.4 \times \frac{1}{8} = \underline{\frac{7}{40} \text{ or } 0.175}$ or equivalent		B1	1
	(b)	$P(L < -3.0 \text{ or } L > 3.0) = 2 \times \left(1 \times \frac{1}{8}\right) = \frac{1}{4}$		M1;A1	2
		M1 for 1/8 seen			
	(c)	P (within 3mm) = $1 - \frac{1}{4} = 0.75$ B(20,0.75)	recognises binomial	B1	
		Using B(20,p)		M1	
		Let X represent number of rods within 3mm			
		$P(X \leq 9 / p = 0.25)$ or $1 - P(X \leq 10 / p = 0.75)$		M1	
		$= 0.9861$ *awrt 0.9861*		A1	4

[7]

7. (a) B1 B1 B1 3

(b) $E(X) = 2$ by symmetry B1 1

(c) $\text{Var}(X) = \frac{1}{12}(5+1)^2$ or $\int \frac{x^2}{6}\,dx - 4 = \left[\frac{x^3}{18}\right]_{-1}^{5} - 4$ M1

$= 3$ A1 2

(d) $P(-0.3 < X < 3.3) = \frac{3.6}{6}$ or $\int_{-0.3}^{3.3} \frac{1}{6}\,dx = \left[\frac{x}{6}\right]_{-0.3}^{-3.3}$ full correct method M1

$= 0.6$ for the correct area A1 2

[8]

8. (a) $f(x) = \frac{1}{4}$, $2 \le x \le 6$ B1

$\frac{1}{4}$ *and range*

$= 0$, otherwise B1 2

0 and range

(b) $E(X) = 4$ by symmetry or formula B1 1

4

(c) Var (X) = $\frac{(6-2)^2}{12}$ M1

Use of formula

= $\frac{4}{3}$ A1 2

$1.\dot{3}$ *or* $1\frac{1}{3}$ *or* $\frac{4}{3}$ *or 1.33*

(d) $F(x) = \int_2^x \frac{1}{4}\,dt = \left[\frac{1}{4}t\right]_2^x$ M1

Use of $\int f(x)\,dx$

= $\frac{1}{4}(x-2)$ A1

$\frac{1}{4}(x-2)$ *or equiv.*

$F(x) = \frac{1}{4}(x-2),\ 2 \le x \le 6$ B1ft

$\frac{1}{4}(x-2)$ *and range*

= 1, $x > 6$
= 0, $x < 2$ B1 4

ends and ranges

(e) $P(2.3 < X < 3.4) = \frac{1}{4}(3.4-2.3)$ M1

Use of area or F(x)

= 0.275 A1 2

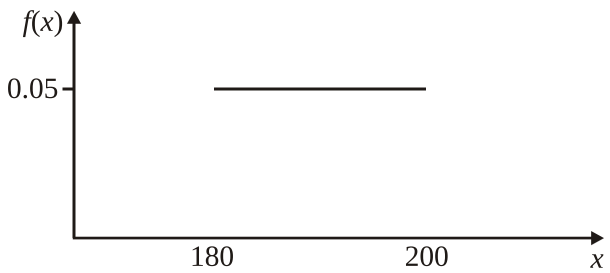
0.275 or $\frac{11}{40}$

[11]

9. (a) <u>Continuous uniform</u>/rectangular B1

$f(x) = \begin{cases} \frac{1}{l}, & 0 \le x \le l \\ 0 & \text{otherwise} \end{cases}$ B1 B1 3

	(b)	$P(X < \frac{1}{3}l) = \frac{1}{l} \times \frac{l}{3} = \underline{\frac{1}{3}}$	M1 A1	2
	(c)	$E(X) = \frac{1}{2}l$	B1	1
	(d)	$P(\text{Both} < \frac{1}{3}l) = \left(\frac{1}{3}\right)^2 = \underline{\frac{1}{9}}$	M1 A1ft	2
		(b)^2		
				[8]
10.	(a)	$P(X < 2.7) = \frac{3.7}{5} = 0.74$	0.74B1	1
	(b)	$E(X) = \frac{4-1}{2} = 1.5$	M1A1	2
		Require minus or complete attempt at integration, 1.5		
	(c)	$\text{Var}(X) = \frac{1}{12}(4+1)^2 = \frac{25}{12} = 2.08\dot{3}$	M1A1	2
		Require plus, $\frac{25}{12}$ *or* $2\frac{1}{12}$ *or* $2.08\dot{3}$ *or 2.08*		
				[5]
11.	(a)	$f(x) = \begin{cases} 0.05 & 180 \le x \le 200 \\ 0 & \text{otherwise} \end{cases}$	B1 B1	



		labels	B1	
		3 parts	B1	4
	(b)	(i) $P(X \le 183) = 3 \times 0.05$	M1	
		$\underline{= 0.15}$	A1	
		(ii) $P(X = 183) = \underline{0}$	B1	3

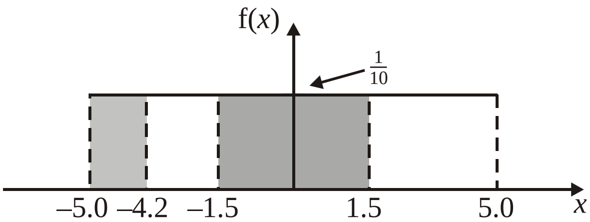
	(c)	IQR = <u>10</u>	B1	1
	(d)	$0.05(200 - x)$; $= 0.05(x - 180) \times 2$ $200 - x = 2x - 360$ <u>$x = 186\frac{2}{3}$ or 187</u>	M1; A1 A1	 3
	(e)	$\frac{1}{3}$ of all cups of lemonade dispensed contains <u>$186\frac{2}{3}$ ml or less</u> (or $\frac{2}{3}$ of all cups of lemonade dispensed contains <u>$186\frac{2}{3}$ ml or more</u>)	B1 B1 ft	2

[13]

12.	(a)	Continuous uniform (Rectangular) U(–0.5, 0.5)	B1 B1	2
	(b)	P(error within 0. 2 cm) = 2 × 0.2 = 0.4	M1 A1	2
	(c)	P(both within 2 cm) = $0.4^2 = 0.16$	M1 A1	2

[6]

13.

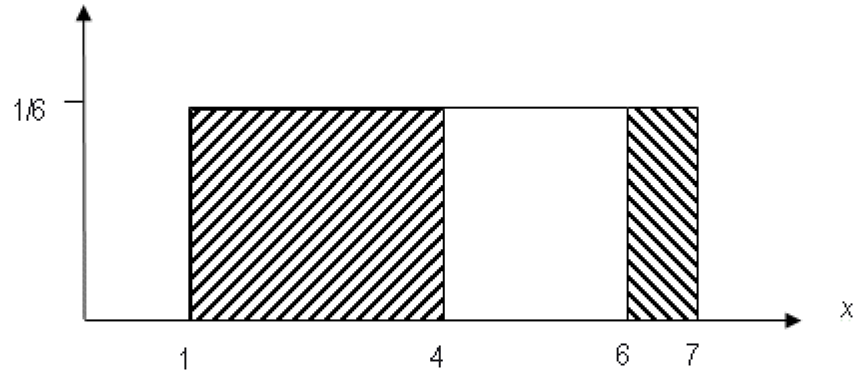


	(a)	$P(X < -4.2) = \dfrac{0.8}{10} = 0.08$	B1	1
	(b)	$P(\lvert X \rvert < 1.5) = \dfrac{3}{10} = 0.3$	M1 A1	2

(c)	Y = no. of lengths with $\lvert X \rvert < 1.5$	$\therefore\ Y \sim \mathrm{B}(10, 0.3)$	M1	
	$\mathrm{P}(Y > 5) = 1 - \mathrm{P}(Y \le 5)$		M1	
	$= 1 - 0.9527 \quad = 0.0473$		A1	3
	R = no. of lengths of piping rejected			
	$R \sim \mathrm{B}(60, 0.08) \Rightarrow R \approx\ \sim\mathrm{Po}(4.8)$	4.8 or 60 × (a)	B1 ft	
	$\mathrm{P}(R \le 2) = \mathrm{e}^{-4.8}\left[1 + 4.8 + \frac{(4.8)^2}{2!}\right]$	Po and ≤ 2, formula	M1, M1 A1 ft	
	(ft for their λ if full expression seen)			
	$= 17.32 \times \mathrm{e}^{-4.8} = 0.1425\ldots$			
	(accept awrt 0.143)		A1 cao5	

[11]

1. A minority of students got this completely correct and those that did often showed minimal working with only a diagram as evidence of their method. A major source of error was treating the distribution as a discrete uniform rather than a continuous uniform. Most students, however, simply worked out P(X > 6) and gave this as their answer, unaware that there was more to the question than this. The easiest and perhaps most successful solutions came from candidates who drew a diagram and realised they needed $P(X < 4) + P(X > 6)$.



2. Many candidates attained full or nearly full marks for this question.

In part (a) many candidates were unable to correctly state P(A > 3) = $\frac{2}{5}$.

In part (b) some candidates multiplied their answer to (a) by 3 rather than finding (a) cubed.

The most common error in question 6 was drawing the sketch graph incorrectly in part (d). A straight line was often seen, either sloping from 0 to 5 or parallel to the x-axis.

In part (e) a few candidates attempted to calculate the mode rather than reading it straight from the graph. Not only did this waste time the result was usually incorrect.

In part (f) candidates confused f(x) with F(x) and/or used the formula for E(Y) incorrectly. Errors in the simple integration were often seen.

In part (g) few candidates chose to use P(X > 3) = 1 – F(3) and instead used the method involving integration where too often the incorrect limits were used.

3. The majority of candidates were able to correctly answer parts (a) and (b) although a minority were able to draw the p.d.f correctly in part (b) but were unable to do part (a). The most common variation was $\mathrm{f}(x) = \frac{1}{9}x$. A few candidates also used this incorrect version in part (c) (alternative version) and in (d). However, most of the candidates who started this question with an incorrect p.d.f. then went on to use the correct p.d.f. from (b) onwards, with no evidence of cognitive dissonance.

In part (c) the candidates who chose to go down the integration route were usually successful. Those who attempted to use the formulae were not particularly successful for a variety of reasons. There were errors in finding E(X) and or Var(X) or problems with the formula (incorrect rearrangement, failure to square). A variety of incorrect expressions were often seen in particular E(X^2) = (E(X))^2 and E(X^2) = Var(X)

Part (d) was accessible to a very large majority of candidates. Many of the candidates who had problems in the previous parts of the question were able to regain their composure and obtain both marks.

4. Part (a) was answered well. A minority of candidates had difficulty with parts (b) and (c). In (b) they generally looked at P(X > 2) rather than P($X \le 2$).

In part (c) $\frac{1}{5} \times 5$ or $\left(\frac{4}{5}\right)^5$ was used even when part (b) was correct.

The work on part (d) was disappointing. Candidates did not understand the concept of conditional probability.

Only the very best candidates are likely to have got this correct. Those that did used the U [0, 5] or u [5, 10] route.

5. This question was answered very well with many completely accurate solutions. In part (a) some candidates neglected to specify a **continuous** Uniform distribution and in a lot of cases failed to show the graph for values of $x < 0$ and $x > 5$ with thick horizontal lines. In part (b) the mean and the variance were found correctly using the formulae. The integration method was rarely used. Most candidates were able to work out the probability in (c) using geometry but many failed to realise that for a continuous distribution the probability of an integer value was zero.

6. Part (a) was mostly correct although there were some very long-winded solutions seen. Drawing a diagram (as is often the case) was a successful approach to use. Part (b) was generally answered correctly although if integration was used the solution tended to be lengthy. Common wrong answers were 1/8 and ¾ were common wrong answers. Weaker candidates clearly did not understand the use of the word “or” in probability and failed to add the probabilities for the two parts. In part (c) whilst most candidates recognised a binomial situation and found the correct value for p, few candidates were able to cope with a value of p > 0.5. It was common to see P(X > 10) given X~B(20, 0.75) interpreted as P($Y \le 10$), or 1 -P($Y \le 10$), given X~B(20, 0.25). There was poor understanding of how to use the binomial tables for situations in which p is greater than 0.5.

7. Most candidates got a mark of 7 out of the 8 possible.
In part (a) only a minority of candidates considered the regions X < –1 and X > 5 and indicated them on their graphs.
Most were able to state the correct answer by calculation or by symmetry in part (b). In part (c) the errors arose from using ½ instead of 1/12 in the formula. Those using integration sometimes forgot to subtract $E(X)^2$.

8. This question was generally completed to a high standard. Errors in part (a) included using ¼ x or not stating ranges. It is perhaps significant that those candidates who drew quick sketches were least likely to forget about the ranges. Part (b) caused few problems and most candidates were awarded the mark. Some candidates used integration, which was time-consuming for 1 mark. Part (c) was generally done well, errors included: division by 2, or adding a and b, or not squaring. There were again a small number of candidates who chose to integrate, using $Var(X) = E(X^2) – [E(X)]^2$, despite the fact that this involves considerably more work than the formula. However, many of these responses were accurate. There were a large number of perfect solutions to part (d). The relative simplicity of the function perhaps gave these candidates a chance to demonstrate their understanding of the topic. Many successful candidates were able to skirt the issue of a 'variable upper limit'. However, the most common, and serious, problem was the failure to deal with the lower limit of the definite integral. There is of course an alternative approach using an indefinite integral. A few candidates used this method successfully, clearly calculating and stating the constant of integration. There were many, however, who omitted the constant of integration. The B1 ft allowed some weaker candidates to score well in this part. Sometimes the ranges for 0 and 1 were confused. Part (e) was generally very well done by a large majority of candidates. There was evidence that candidates who had become confused and discouraged in the earlier parts had made a fresh start to part (e). The use of diagrams to identify the required area was again fairly common and appeared to help candidates.

9. Too many candidates left out 'continuous' in part (a). Continuous uniform or rectangular was required to gain the mark for the name of the distribution and very few candidates were able to specify the probability density function in full. This meant that few of them could answer parts (b) and (c) correctly but they were able to follow through and gain the marks in part (d).

10. This question was tackled effectively by the majority of candidates. A few failed to appreciate that this was a continuous and not a discrete distribution and the use of –1 as a limit confused weak candidates. .

11. This question was not popular with the candidates. In part (a), it was rare to see a completely correct solution. Common errors were not labelling the key points on their graph and not making the three parts obvious. In part (b) many candidates answered (ii) correctly but few realised that since the distribution was continuous the $P(X = 183) = 0$. In part (d) a minority of candidates used the ratios the wrong way round giving an incorrect answer of $193\frac{1}{3}$. In part (e) many candidates failed to relate their findings in part (d) to the context of the question.

12. The least well answered question by most candidates. Very few specified the distribution fully or gave a convincing justification for their answer in part (b). Even the best candidates struggled to gain full marks.

13. No Report available for this question.