Mark Scheme 4732 January 2007

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Note: "3 sfs" means an answer which is equal to, or rounds to, the given answer. If such an answer is seen and then later rounded, apply ISW. Penalize over-rounding only once in paper, except qu 8(ii).

	-rounding only once in paper, except qu 8(ii).	P	
1i	$\frac{1 - (^{3}/_{10} + ^{1}/_{5} + ^{2}/_{5})}{^{1}/_{10}}$	M1 A1 2	or $(^{3}/_{10} + ^{1}/_{5} + ^{2}/_{5}) + p = 1$
ii	$\frac{3}{3}_{10} + 2 x^{1}_{5} + 3 x^{2}_{5}$ $\frac{19}{10}_{10}$ oe	M1 A1 2	$\div 4 \text{or6} \Rightarrow M0A0$
Total	/10/00	4	
2i	$x = 20; y = 11; x^2 = 96; y^2 = 31; xy$		
21	$ \begin{array}{l} =52 \\ S_{xx} = 16 \\ S_{xy} = 6.8 \\ S_{xy} = 8 \end{array} \text{or } 1.36 \\ \end{array} $	B1 B1 B1 M1	dep -1≤ <i>r</i> ≤ 1
<u></u>	$r = \frac{8}{\sqrt{(16x6.8)}} \text{or} \frac{1.6}{\sqrt{(3.2x1.36)}}$ = 0.767 (3 sfs)	A1 5	ft their S's (S_{xx} & S_{yy} +ve) for M1 only
ii	Small sample oe	B1f 1	
Total		6	
3i	120	B1 1	not just 5!
iia	$3 x 4! \text{ or } 72 (\div 5!)$ $\frac{3}{5} 0e$	M1 A1 2	oe, eg $\frac{72}{120}$
b	Starts 1 or 21 (both)	M1	12,13,14,15, (≥2 of these incl 21, or allow 1 extra) can be implied by wking
	$\frac{1}{5} + \frac{1}{5} \times \frac{1}{4}$	M1	or $5x 3!$ or $4! + 3!$ ($\div 5!$)
Total	$= \frac{1}{4}$ oe	A1 3 6	complement: full equiv steps for Ms
4ia	W&Y oe	B1 1	
b	X oe	B1 1	
ii	Geo probs always decrease or Geo has no upper limit to x or $x \neq 0$	B1 1	Geo not fixed no. of values diags have fixed no of trials not Geo has +ve skew
iii	W Bin probs cannot fall then rise	B1 B1dep 2	indep allow Bin probs rise then fall
	or bimodal		
Total 5i	$\frac{2685 - \frac{140 \times 106.8}{2}}{2}$ or 2685 -	5	
	$\frac{\frac{2685 - 8}{8}}{3500 - \frac{140^2}{8}} \text{or } \frac{2685 - 8}{8 \times 17.5 \times 13.35}$	M1	Correct sub in any correct formula for b (incl. $(x - \overline{x})$ etc)
	$= \frac{136}{175}$ or 0.777 (3 sfs)	A1	
	$y - \frac{106.8}{8} = 0.777(x - \frac{140}{8})$ y=0.78x -0.25 or better or $y = \frac{136}{175}x - \frac{1}{4}$	M1 A1 4	or $a = \frac{106.8}{8} - 0.777 x^{140} = 0.000 \text{ ft } b$ for M1 $\geq 2 \text{ sfs sufficient for coeffs}$
ii	0.78 x 12 – 0.25 = 9.1 (2 sfs)	M1 A1f 2	M1: ft their equn A1: dep const term in equn
iiia	Reliable	B1	Just "reliable" for both: B1
b	Unreliable because extrapolating oe	B1 2	

	бі	$\text{Geo}(^2/_3)$ stated	M1	or implied by $(^{1}/_{3})^{n} \times ^{2}/_{3}$
		$(^{1}/_{3})^{3} \times ^{2}/_{3}$	M1	
		$= \frac{2}{81}$ or 0.0247 (3 sfs)	A1 3	

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ii $\binom{(1/3)^3}{1 - \binom{1}{3}}$ M1 M1 M1or $\frac{2}{3} \frac{1}{3} $					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ii	$\left[\binom{1}{2}^{3}\right]$	M1		or $\frac{2}{2} + \frac{1}{2} \frac{x^2}{2} + \frac{1}{2} \frac{x^2}{2} \cdot M2$
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	п				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		1 - (73)	1011		
iii1/2/3 = 3/2 oeMi Al2Total87i $\frac{2}{\sqrt{9}}$ or $\frac{7}{\sqrt{9}}$ oe seen $\frac{1}{\sqrt{9}}$ or $\frac{7}{\sqrt{9}}$ oe seenB1 B1 B1 B1ie 8 correct branches only, ignore probs & values, but headings not reg'd or $\frac{1}{\sqrt{9}}$ or $\frac{7}{\sqrt{9}}$ oe seen1i $\frac{3}{\sqrt{10}}$ x $\frac{7}{\sqrt{9}}$ + $\frac{7}{\sqrt{10}}$ x $\frac{5}{\sqrt{9}}$ M2 M2or $\frac{3}{\sqrt{10}}$ x $\frac{7}{\sqrt{9}}$ descence including probs and values, but headings not reg'd or $\frac{1}{\sqrt{10}}$ x $\frac{7}{\sqrt{9}}$ + $\frac{7}{\sqrt{10}}$ x $\frac{5}{\sqrt{9}}$ 1ii $\frac{3}{\sqrt{10}}$ x $\frac{7}{\sqrt{9}}$ + $\frac{7}{\sqrt{10}}$ x $\frac{5}{\sqrt{9}}$ M2 M2or $\frac{3}{\sqrt{10}}$ x $\frac{7}{\sqrt{9}}$ x $\frac{7}{\sqrt{10}}$ 1ii $\frac{3}{\sqrt{10}}$ x $\frac{7}{\sqrt{9}}$ + $\frac{7}{\sqrt{10}}$ x $\frac{6}{\sqrt{9}}$ M2 M2M1: one correct prod or any prod + $\frac{7}{\sqrt{10}}$ $\frac{14}{\sqrt{10}}$ or 0.933 oc $\frac{14}{\sqrt{10}}$ x $\frac{7}{\sqrt{9}}$ + $\frac{7}{\sqrt{10}}$ x $\frac{5}{\sqrt{9}}$ M2M1: one correct prod $\frac{12}{\sqrt{9}}$ or $\frac{7}{\sqrt{9}}$ of $\frac{7}{\sqrt{9}}$ or $\frac{7}{\sqrt{9}}$ of $\frac{7}{\sqrt{9}}$ s $\frac{7}{\sqrt{10}}$ x $\frac{7}{\sqrt{9}}$ M2M1: one correct prod $\frac{11}{\sqrt{9}}$ or 0.9.525 oeA1 3 cao3 caocao or if treat as cont data: read cf curve or interp at 25 & & 75Total11 and and be e 2 LQ = 1 or UQ = 4 $\sqrt{(-x^2 f/100 - m^2)}$ or $\sqrt{(-x^2 f/100 - m^2)}$		26 0.052 (2.5)	. 1	2	$1 - (7_3)$ Of $1 - (7_3 + 7_3 X 7_3 + (7_3) X 7_3)$.
= 3/2. oeA12Total87i $\frac{2}{7_9}$ or $\frac{7}{7_9}$ oe seenB1 $\frac{1}{3_7}$ or $\frac{7}{9}$ oe seenB1 $\frac{1}{7_9}$ or $\frac{7}{7_9}$ oe seenB1 $\frac{1}{7_9}$ or $\frac{7}{7_9}$ oe seenB1 $\frac{1}{7_9}$ or $\frac{7}{7_9}$ oe seenB1Salt correct structureB1 $\frac{1}{10}$ x $\frac{7}{7_9} + \frac{7}{10}$ x $\frac{3}{7_9} + \frac{7}{10}$ x $\frac{6}{7_9}$ $\frac{1}{11}$ $\frac{2}{7_{10}}$ x $\frac{7}{7_9} + \frac{7}{10}$ x $\frac{6}{7_9}$ $\frac{1}{11}$ $\frac{2}{7_{10}}$ x $\frac{7}{7_9} + \frac{7}{10}$ x $\frac{6}{7_9}$ $\frac{1}{11}$ $\frac{2}{7_{10}}$ x $\frac{7}{7_9}$ x $\frac{7}{7_8} + \frac{7}{10}$ x $\frac{6}{7_9}$ $\frac{1}{11}$ $\frac{2}{7_{10}}$ x $\frac{7}{7_9}$ x $\frac{7}{7_9}$ $\frac{1}{7_{10}}$ x $\frac{7}{7_9}$ x $\frac{7}{7_9}$ $\frac{1}{2}$ or 0.525 oeA1No ft from diag except: with replacement: (i) structure: B1 (ii) $\frac{91}{100}$: B2 (iii) 0.553: B2Total118iMed = 2LQ = 1 or UQ = 4B1 $1QR = 3$ A1 3 cao 3 date mpted ≥ 5 terms $\sqrt{(-x-m)^2}/100$ fully correct but ft m $\sqrt{(-x-m)^2}/100$ fully correct but ft m 1.6 or 1.7 or 3 st ans that rounds to 2.6 $\frac{x^2}{7}$ or $\frac{x-m}{7}^2$ f ≥ 5 terms $\sqrt{(-x-m)^2}/100$ fully correct but ft m $\sqrt{(-x-m)^2}/100$ fully correct but ft m 1.6 or 1.7 or 3 st ans that rounds to 1.6 or 1.7 $\frac{1}{6}$ $\frac{1}{9}$ or $\frac{1}{\sqrt{(x-x-m)^2}/100}$ fully correct but ft m 1.6 or 1.7 or 3 st ans that rounds to 1.6 or 1.7 $\frac{1}{6}$ $\frac{1}{9}$ or $\frac{1}{10}$ fully correct but ft m <th></th> <th></th> <th></th> <th></th> <th></th>					
Total87i $\frac{2}{1_9}$ or $\frac{7}{9}$ o escenB1 $\frac{1}{9}$ or $\frac{7}{8}$ o escenB1 $\frac{1}{9}$ or $\frac{7}{8}$ o escenB1 $\frac{1}{9}$ or $\frac{7}{8}$ o escenB1Correct structureB1All correctB1ii $\frac{7}{10} \times \frac{7}{9} + \frac{7}{10} \times \frac{3}{9} + \frac{7}{10} \times \frac{3}{9}$ $\frac{7}{10} \times \frac{7}{9} + \frac{7}{10} \times \frac{3}{9} + \frac{7}{10} \times \frac{3}{9}$ $\frac{7}{10} \times \frac{7}{9} + \frac{7}{10} \times \frac{3}{9} + \frac{7}{10} \times \frac{9}{9}$ $\frac{11}{10} \times \frac{1}{9} + \frac{7}{10} \times \frac{3}{9} + \frac{7}{10} \times \frac{6}{9}$ $\frac{11}{10} \times \frac{2}{9} \times \frac{7}{8} + \frac{7}{10} \times \frac{6}{9}$ $\frac{11}{10} \times \frac{2}{9} \times \frac{7}{8} + \frac{7}{10} \times \frac{6}{9}$ $\frac{2}{11} \sqrt{9}$ or 0.525 ocA13 $\frac{2}{11} \sqrt{9}$ or 0.525 ocA13 $\frac{11}{10} \times \frac{1}{9} \times \frac{7}{9} \times 7$	iii				
7i $\frac{2}{9}$ or $\frac{7}{9}$ o e seenB1 $\frac{3}{9}$ or $\frac{7}{8}$ o e seenB1 $\frac{1}{9}$ or $\frac{7}{8}$ o e seenB1Correct structureB1All correctB1 $\frac{1}{10}$ x $\frac{7}{9} + \frac{7}{10}$ x $\frac{3}{9} + \frac{7}{10}$ x $\frac{9}{9}$ $\frac{1}{11}$ $\frac{7}{10}$ x $\frac{7}{9} + \frac{7}{10}$ x $\frac{3}{9} + \frac{7}{10}$ x $\frac{9}{9}$ $\frac{1}{11}$ $\frac{7}{10}$ x $\frac{7}{9} + \frac{7}{10}$ x $\frac{9}{9}$ $\frac{1}{11}$ $\frac{7}{10}$ x $\frac{7}{9} + \frac{7}{10}$ x $\frac{9}{9}$ $\frac{1}{14}$ or 0.933 oeA1 $\frac{3}{10}$ or $\frac{2}{9}$ x $\frac{7}{8} + \frac{7}{10}$ x $\frac{6}{9}$ $\frac{21}{90}$ or 0.525 oeA1No ft from diag except: with replacement:(i) structure: B1 $\frac{11}{20}$ or 0.525 oeNo ft from diag except: with replacement: 10 x $2 = 1$ or UQ = 4B1SiMed = 2LQ = 1 or UQ = 4M1at a score as cont data: read cf curve or interp at 25 & 75IQR = 3A1 $\frac{3}{26}$ or 3 sf ans thar rounds to 2.6 $\frac{3}{27}$ or $\frac{1}{\sqrt{3}} \frac{1}{9} \leq 5$ terms $\sqrt{(\frac{x}{7}/100} \frac{x^2/1}{100} \frac{x^2/1}{10$		= 3/2 oe	A1	2	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Total		8		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	7i	$^{2}/_{\circ}$ or $^{7}/_{\circ}$ or seen	B1		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$,1				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		$\frac{1}{100} \text{ or } \frac{7}{100} \text{ oc seen}$			
All correctB1ignore probs & values, including probs and values, but headings not reg'd including probs and values, but headings not reg'd or $3/_{10}x^{7/_9} + 7/_{10}$ or $1 - 3/_{10}x^{2/_9}$ M1: one correct prod or any prod + $7/_{10}$ $14/_{15}$ or 0.933 oe $13/_{10}x^{2/_9}x^{7/_8} + 7/_{10}x^{6/_9}$ $11/_{10}x^{2/_9}x^{7/_9} + 7/_{10}$ or $1 - 3/_{10}x^{2/_9}$ M1: one correct prod or any prod + $7/_{10}$ $10 x^{2/_9}x^{7/_9} + 7/_{10}$ or 0.525 oe No fi from diag except: with replacement: (i) structure: B1 11 Bi Med = 2 $LQ = 1$ or $UQ = 4$ $I1$ assume last value = 7 (or eg 7.5 or 8 or 8.5) iiB1 B1 cao A1 3 caocao or if treat as cont data: read cf curve or interp at 25 & 75 cao or if treat as cont data: read cf curve or interp at 25 & 75 id and the second secon					
All correctB15including probs and values, but headings not reg'd or ${}^3/_{10} x {}^7/_9 + {}^7/_{10} x {}^3/_9 + {}^7/_{10} x {}^3/_9 + {}^7/_{10} x {}^3/_9 + {}^7/_{10} x {}^3/_9 + {}^7/_{10} x {}^6/_9$ M2M1out correct prod or any prod + ${}^7/_{10} x {}^2/_9$ iii ${}^3/_{10} x {}^2/_9 x {}^7/_8 + {}^7/_{10} x {}^6/_9$ M2M1: one correct prod or any prod + ${}^7/_{10} x {}^2/_9$ iii ${}^3/_{10} x {}^2/_9 x {}^7/_8 + {}^7/_{10} x {}^6/_9$ M2M1: one correct prod ${}^{21}/_{40}$ or 0.525 oeA13caoNo ft from diag except: with replacement: (i) structure: B1 (ii) ${}^{91}/_{100}$: B2 (iii) 0.553: B2Total118iMed = 2 LQ = 1 or UQ = 4B1 M1iiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1iiiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1iiiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1iiiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1iiiAssume last value = 7 (or eg 7.5 or 8 or 1.7)B1 $v(x, x^2f/100 - m^2)$ or $v(x, x^2f/100 - m^2)$ or $v(x,$		Correct structure	BI		
ii $j_{10} x^{7} / 9 + 7/_{10} x^{3} / 9 + 7/_{10} x^{6} / 9$ M2but headings not req'diii $j_{10} x^{7} / 9 + 7/_{10} x^{3} / 9 + 7/_{10} x^{6} / 9$ M2or $3/_{10} x^{7} / 9 + 7/_{10} or 1 - 3/_{10} x^{2} / 9$ iiii $3/_{10} x^{7} / 9 x^{7} / 8 + 7/_{10} x^{6} / 9$ M2M1: one correct prod or any prod + $7/_{10}$ $2^{1} / 40$ or 0.525 oeA13caoNo fit from diag except: with replacement:(i) structure: B1(ii) $9^{1} /_{100}$: B2 11 8iMed = 2B1cao $1QR = 3$ A13caoiiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1stated, & not contradicted in wking eg 7-9 or 7.8, 9 Not just in wking allow "midpts" in xf or x^2f xf attempted ≥ 5 termsM1dep M3 $\sqrt{(x^2f/100 - m^2)}$ or $\sqrt{(x^2f/100 - m^2)}$ or $($					
ii $3'_{10}x^{7}/_{9} + 7'_{10}x^{3}/_{9} + 7'_{10}x^{6}/_{9}$ M2or $3'_{10}x^{7}/_{9} + 7'_{10}$ or $1 - 3'_{10}x^{2}/_{9}$ iii $1^{4}/_{15}$ or 0.933 oeA13or $3'_{10}x^{7}/_{9} + 7'_{10}$ or $1 - 3'_{10}x^{2}/_{9}$ iii $3'_{10}x^{2}/_{9}x^{7}/_{8} + 7'_{10}x^{6}/_{9}$ M2M1: one correct prodor $3'_{10}x^{2}/_{9}$ iii $3'_{10}x^{2}/_{9}x^{7}/_{8} + 7'_{10}x^{6}/_{9}$ M2M1: one correct prodarea $2^{1}/_{40}$ or 0.525 oeA13caoNo ft from diag except: with replacement:(i) structure: B1(ii) $9^{1}/_{100}$: B2(iii) 0.553 : B2Total11cao8iMed = 2B1caoLQ = 1 or UQ = 4M1caoiiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1stated, & not contradicted in wkingeg 7-9 or 7,8, 9Not just in wking xf attempted ≥ 5 termsM1 2.6 or 3 sf ans that rounds to 2.6 A1 $x'f$ or $, x-m)^2 f \geq 5$ termsM1 $\sqrt{(xf'/100 - m^2)}$ or $\sqrt{(xf'/100 - m^2)}$ oriiiMedian less affected by extremes orB1outliers etc (NOT anomalies)B1ivSmall change in var'n leads to lge change in IQR 10 Wo only just 4, hence IQR exageratedor ot affected by open-ended intervalgeneral comment acceptableB11orOM % (or y) decr (as x incr) oeB12<		All correct	B1	5	including probs and values,
ii $3'_{10}x^{7}/_{9} + 7'_{10}x^{3}/_{9} + 7'_{10}x^{6}/_{9}$ M2or $3'_{10}x^{7}/_{9} + 7'_{10}$ or $1 - 3'_{10}x^{2}/_{9}$ iii $1^{4}/_{15}$ or 0.933 oeA13or $3'_{10}x^{7}/_{9} + 7'_{10}$ or $1 - 3'_{10}x^{2}/_{9}$ iii $3'_{10}x^{2}/_{9}x^{7}/_{8} + 7'_{10}x^{6}/_{9}$ M2M1: one correct prodor $3'_{10}x^{2}/_{9}$ iii $3'_{10}x^{2}/_{9}x^{7}/_{8} + 7'_{10}x^{6}/_{9}$ M2M1: one correct prodarea $2^{1}/_{40}$ or 0.525 oeA13caoNo ft from diag except: with replacement:(i) structure: B1(ii) $9^{1}/_{100}$: B2(iii) 0.553 : B2Total11cao8iMed = 2B1caoLQ = 1 or UQ = 4M1caoiiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1stated, & not contradicted in wkingeg 7-9 or 7,8, 9Not just in wking xf attempted ≥ 5 termsM1 2.6 or 3 sf ans that rounds to 2.6 A1 $x'f$ or $, x-m)^2 f \geq 5$ termsM1 $\sqrt{(xf'/100 - m^2)}$ or $\sqrt{(xf'/100 - m^2)}$ oriiiMedian less affected by extremes orB1outliers etc (NOT anomalies)B1ivSmall change in var'n leads to lge change in IQR 10 Wo only just 4, hence IQR exageratedor ot affected by open-ended intervalgeneral comment acceptableB11orOM % (or y) decr (as x incr) oeB12<					but headings not req'd
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$\begin{array}{c c c c c c c c c c c c c c c c c c c $					
$21/40$ or 0.525 oeA1 3caoNo ft from diag except: with replacement: (i) structure: B1 (ii) $91/100$: B2 (iii) 0.553: B2Total118iMed = 2B1 $LQ = 1$ or $UQ = 4$ B1iiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1 <i>xf</i> attempted ≥ 5 termsA1 3 <i>xf</i> attempted ≥ 5 termsM1 $\sqrt{(x^2f/100 - m^2)}$ orM1 $\sqrt{(x^2f/100 - m^2)}$ orM1 $\sqrt{(x^2f/100 - m^2)}$ orM1 $\sqrt{(x^2f/100 - m^2)}$ orM1Median less affected by extremes orB1outliers etc (NOT anomalies)B1iiiMedian less affected by extremes oroutliers etc (NOT anomalies)B1ivSmall change in var'n leads to lge change in IQR UQ for W only just 4, hence IQR exagerated orig data shows variations are similarvOM % (or y) decr (as x incr) oeb1Tanks reversed in OM or not rev in W NIS		$^{14}/_{15}$ or 0.933 or	A 1	3	
$21/40$ or 0.525 oeA1 3caoNo ft from diag except: with replacement: (i) structure: B1 (ii) $91/100$: B2 (iii) 0.553: B2Total118iMed = 2B1 $LQ = 1$ or $UQ = 4$ B1iiAssume last value = 7 (or eg 7.5 or 8 or 8.5)B1 <i>xf</i> attempted ≥ 5 termsA1 3 <i>xf</i> attempted ≥ 5 termsM1 $\sqrt{(x^2f/100 - m^2)}$ orM1 $\sqrt{(x^2f/100 - m^2)}$ orM1 $\sqrt{(x^2f/100 - m^2)}$ orM1 $\sqrt{(x^2f/100 - m^2)}$ orM1Median less affected by extremes orB1outliers etc (NOT anomalies)B1iiiMedian less affected by extremes oroutliers etc (NOT anomalies)B1ivSmall change in var'n leads to lge change in IQR UQ for W only just 4, hence IQR exagerated orig data shows variations are similarvOM % (or y) decr (as x incr) oeb1Tanks reversed in OM or not rev in W NIS		$3/2^{2}/2^{7}/2^{7}/2^{7}/2^{6}/2^{6}$			
No ft from diag except: with replacement:(i) structure: B1(ii) ${}^{91}/_{100}$: B2(iii) 0.553: B2Total118iMed = 2 LQ = 1 or UQ = 4B1 M1cao or if treat as cont data: read cf curve or interp at 25 & 75IQR = 3A13caoiiAssume last value = 7 (or eg 7.5 or 8 or 8.5) xf attempted ≥ 5 termsB1stated, & not contradicted in wking eg 7-9 or 7,8, 9 Not just in wking allow "midpts" in xf or x ² f2.6or 3 sf ans that rounds to 2.6 x ² f or .x-m) ² f ≥ 5 terms $\sqrt{(x^2f/100 - m^2)}$ or $\sqrt{(x-m)^2f/100}$ for 1.7 or 3 sf ans that rounds to 1.6 or 1.7A1 A1 A1iiiMedian less affected by extremes or outliers etc (NOT anomalies)B11 or median is an integer or mean not int. or not affected by open-ended interval general comment acceptableivSmall change in var'n leads to Ige change in IQR UQ for W only just 4, hence IQR exaggerated orig data shows variations are similarB11 o or specific comment essentialvOM % (or y) decr (as x incr) oe Old MoatB12NIS	111	$/_{10} X /_{9} X /_{8} + /_{10} X /_{9}$	IVI Z		M1: one correct prod
No ft from diag except: with replacement:(i) structure: B1(ii) ${}^{91}/_{100}$: B2(iii) 0.553: B2Total118iMed = 2 LQ = 1 or UQ = 4B1 M1cao or if treat as cont data: read cf curve or interp at 25 & 75IQR = 3A13caoiiAssume last value = 7 (or eg 7.5 or 8 or 8.5) xf attempted ≥ 5 termsB1stated, & not contradicted in wking eg 7-9 or 7,8, 9 Not just in wking allow "midpts" in xf or x ² f2.6or 3 sf ans that rounds to 2.6 x ² f or .x-m) ² f ≥ 5 terms $\sqrt{(x^2f/100 - m^2)}$ or $\sqrt{(x-m)^2f/100}$ for 1.7 or 3 sf ans that rounds to 1.6 or 1.7A1 A1 A1iiiMedian less affected by extremes or outliers etc (NOT anomalies)B11 or median is an integer or mean not int. or not affected by open-ended interval general comment acceptableivSmall change in var'n leads to Ige change in IQR UQ for W only just 4, hence IQR exaggerated orig data shows variations are similarB11 o or specific comment essentialvOM % (or y) decr (as x incr) oe Old MoatB12NIS		21 / 0 707			
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v $OM \%$ (or y) decr (as x incr) oe $B1$ $B1 2$ ranks reversed in OM or not rev in WOld Moat $B1 2$ NIS			B 1	1	
Old Moat B1 2 NIS	v				
	v			\mathbf{r}	
Total 13					CINI CINI
	Total		13		

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Mark Scheme

Jan 2007

9i	$^{11}C_5 x (^{1}/_4)^6 x (^{3}/_4)^5$	M1		or 462 x $({}^{1}/_{4})^{6}$ x $({}^{3}/_{4})^{5}$
	0.0268 (3 sfs)	A1	2	
ii	$q^{11} = 0.05$ or $(1-p)^{11} = 0.05$	M1		$(any letter except p)^{11} = 0.05$ oe
	$\sqrt[11]{0.05}$	M1		oe or invlog $(\frac{\log 0.05}{11})$
	q = 0.762 or 0.7616	A1		
	p = 0.238 (3 sfs)	A1f	4	ft dep M2
iii	$11 \ge p \ge (1-p) = 1.76$ oe	M1		not $11pq = 1.76$
	$11p - 11p^2 = 1.76$ or $p - p^2 = 0.16$	A1		any correct equn after mult out
	$11p^2 - 11p + 1.76 = 0$ or $p^2 - p + 0.16 = 0$	A1		or equiv with $= 0$
	$(25p^2 - 25p + 4 = 0)$			_
	(5p-1)(5p-4) = 0			or correct fact'n or subst'n for their quad
	or $p = \frac{11 - \sqrt{(11^2 - 4x11x1.76)}}{11 - \sqrt{(11^2 - 4x11x1.76)}}$	M1		equ'n eg $p = \underline{1 \pm \sqrt{(1 - 4x0.16)}}$
	2 x 11			2
	p = 0.2 or 0.8	A1	5	
Total		11		
	Total 72 marks			