Question	Scheme	Marks
	A1 Allow $k = 3+\frac{2\sqrt{6}}{3}$ or awrt 4.63 only (must reject other root if found)	

Question	Scheme	Marks
5(a)	$(1,1,2) \rightarrow \frac{2}{5}\times\frac{2}{5}\times\frac{1}{5}$	B1
	$(1,1,5) \rightarrow \frac{2}{5}\times\frac{2}{5}\times\frac{4}{5}$	B1
	$(1,2,2)(2,1,2) \rightarrow 2\times\frac{2}{5}\times\frac{3}{5}\times\frac{1}{5}$	M1
	$(1,2,5)(2,1,5) \rightarrow 2\times\frac{2}{5}\times\frac{3}{5}\times\frac{4}{5}$	M1
	$(2,2,2) \rightarrow \frac{3}{5}\times\frac{3}{5}\times\frac{1}{5}$	
	$(2,2,5) \rightarrow \frac{3}{5}\times\frac{3}{5}\times\frac{4}{5}$	

$[t]$	4	5	6	7	8	9
$[\mathrm{P}(T=t)]$	$\frac{4}{125}$ (0.032)	$\frac{12}{125}$ (0.096)	$\frac{9}{125}$ (0.072)	$\frac{16}{125}$ (0.128)	$\frac{48}{125}$ (0.384)	$\frac{36}{125}$ (0.288)

B1 A1 A1 (7)

(b)	$m=1 \quad m=2$	B1
	$\mathrm{P}(M=1) = '\frac{4}{125}' + '\frac{16}{125}'$	
	$\mathrm{P}(M=2) = '\frac{12}{125}' + '\frac{9}{125}' + '\frac{48}{125}' + '\frac{36}{125}'$ or $1-\left('\frac{4}{125}' + '\frac{16}{125}'\right)$	M1 dM1

$[M]$	1	2
$[\mathrm{P}(M=m)]$	$\frac{4}{25}$ or (0.16)	$\frac{21}{25}$ or (0.84)

A1 (4)

	Notes	Total [11]
(a)	NB allow incorrect prob for first 2 B marks and M marks if clear what the probs represent B1 for the 6 samples (1,1,2) (1,1,5) (2,2,2) (2,2,5) (1,2,2) (1,2,5) Allow more than one arrangement for each sample. May be implied by correct answers or product of probabilities ignoring any integer multiplier. Do not award if there are incorrect extras eg (5,5,1) unless they have a probability of zero or are ignored B1 for having just the 8 samples. Must recognise that only one combination of (1,1,2) **and** (1,1,5) **and** (2,2,2) **and** (2,2,5) are possible and two combinations of (1,2,2) **and** (1,2,5) are possible. May be implied by correct answers or product of probabilities with correct multipliers. Do not award if there are incorrect extras eg (5,5,1) unless they have a probability of zero or ignored 1st M1 for correct product of probabilities for (1,1,2) or (1,1,5) or (2,2,2) or (2,2,5) 2nd M1 for correct product of probabilities for (1,2,2) or (1,2,5) Must have x2 oe B1 all totals correct. (Allow duplicates) Incorrect totals must have probability of 0 A1 dep on 1st M1 only. At least 3 correct probabilities with associated totals. A1 all probabilities correct with associated totals. Totals must only appear once. Extra totals must have probability of 0	
(b)	B1 both values of m. Any extras must have probability of 0 1st M1 Follow through part(a). Correct method for P(M = 1) **or** P(M = 2) Prob in (a) <1 2nd dM1 dependent on previous M being awarded. ft part(a).For correct method for P(M = 1) **and** P(M = 2) Allow 1 – their P(M = 1) or 1 – their P(M = 2)] Prob in (a) <1 A1 fully correct Useful alternative fractions 20/125 and 105/125	