

Qu 4	Scheme	Marks	AO
(a)	$\frac{k}{10} + \frac{k}{20} + \frac{k}{30} + \frac{k}{40} + \frac{k}{50} = 1 \text{ or } \frac{1}{600}(60k + 30k + 20k + 15k + 12k) = 1$ $\text{So } k = \frac{600}{137} \quad (*)$	M1	1.1b
		A1cso	1.1b
		(2)	
		M1	2.1
		M1	3.4
(b)	(Cases are:) $D_1 = 30, D_2 = 50$ and $D_1 = 50, D_2 = 30$ and $D_1 = 40, D_2 = 40$ $P(D_1 + D_2 = 80) = \frac{k}{50} \times \frac{k}{30} \times 2 + \left(\frac{k}{40}\right)^2$ $= 0.0375619... \text{ awrt } \underline{\underline{0.0376}}$	A1	1.1b
		(3)	
		M1	3.1a
		M1	2.1
		A1	2.2a
(c)	Angles are: $a, a + d, a + 2d, a + 3d$ $S_4 = a + (a + d) + (a + 2d) + (a + 3d) = 360$ $2a + 3d = 180 \text{ (o.e.)}$ Smallest angle is $a > 50$ consider cases: $d = 10$ so $a = 75$ <u>or</u> $d = 20$ so $a = 60$ [$d = 30$ gives $a = 45$ no good] $P(D = 10 \text{ or } 20) = \frac{3k}{20} = \frac{90}{\underline{\underline{137}}}$	M1	3.1b
		M1	3.1b
		A1	1.1b
		(5)	
		(10 marks)	
	Notes		
Verify	(a) M1 for clear use of sum of probabilities = 1 (all terms seen) A1 cso (*) M1 scored and no incorrect working seen. (Assume $k = \frac{600}{137}$) to score the final A1 they must have a <u>final</u> comment “$\therefore k = \frac{600}{137}$” (b) 1st M1 for selecting at least 2 of the relevant cases (may be implied by their correct probs) e.g. allow 30, 50 and 50,30 i.e. D_1 and D_2 labels not required 2nd M1 for using the model to obtain a correct expression for two different probabilities. May use letter k or their value for k. Allow for $\frac{k}{50} \times \frac{k}{30} + \left(\frac{k}{40}\right)^2$ <u>or</u> $2 \times \left(\frac{k}{50} \times \frac{k}{30} + \left(\frac{k}{40}\right)^2\right)$ A1 for awrt 0.0376 (exact fraction is $\frac{705}{18769}$) (c) 1st M1 for recognising the 4 angles and finding expressions in terms of d and their a 2nd M1 for using property of quad with these 4 angles (equation can be un-simplified) Allow these two marks for use of a (possible) value of d e.g. $a + a + 10 + a + 20 + a + 30 = 360$ (If at least 3 cases seen allow A1 for e.g. $4a = 300$) <u>or</u> allow M1M1 for a set of 4 angles with sum 360 and possible value of d (3 cases for A1) e.g. (for $d = 20$) 60, 80, 100, 120 1st A1 for $2a + 3d = 180$ condition (o.e.) [Must be in the form $pa + qd = N$] 3rd M1 for examining cases and getting $d = 10$ and $d = 20$ only 2nd A1 for $\frac{90}{137}$ or exact equivalent The correct answer and no obviously incorrect working will score 5/5 A final answer of awrt 0.657 (0.65693...) with no obviously incorrect working scores 4/5		