Question	Answer	Marks	Guidance
6(a)	**Either** Starts with 8: 1680	**B1**	1680 must not be part of a product. May be implied by final answer
	Starts with 7 or 9: 2688	**B1**	May be implied by final answer
	Total: 4368	**B1**	
	Or Alternative 1 Starts with 7, 8 or 9 and ends in 1, 3 or 5: 3024	**(B1)**	Allow for 1008 three times May be implied by final answer
	Starts with 8 or 9 and ends in 7: 672 Starts with 7 or 8 and ends in 9: 672	**(B1)**	For both May be implied by final answer
	Total: 4368	**(B1)**	
	Or Alternative 2 13 ways of obtaining odd 5-digit numbers which start with 7, 8 or 9	**(B1)**	Needs to be part of a product. May be implied by final answer
	${}^{8}\mathrm{P}_{3}$ ways of arranging the remaining 3 digits: 336	**(B1)**	Needs to be part of a product. May be implied by final answer
	Total = $13\times336=4368$	**(B1)**	
	Or Alternative 3 Last digit is 7 or 9: 1344	**B1**	May be implied by final answer
	Last digit is 1, 3 or 5: 3024	**B1**	May be implied by final answer
	Total: 4368	**B1**	
	Or Alternative 4 ${}^{10}\mathrm{P}_{5}-\left({}^{9}\mathrm{P}_{4}\times7\right)-\left({}^{8}\mathrm{P}_{3}\times5\right)-\left({}^{8}\mathrm{P}_{3}\times4\right)$ $-\left({}^{8}\mathrm{P}_{3}\times5\right)$	**B2**	Must be complete
	Total: 4368	**B1**	
6(b)	$\frac{n!}{(n-3)!3!}=\frac{2n!}{(n-2)!2!}$ soi	**B1**	
	$(n-2)=6$ soi	**B2**	**Dep B1** on first **B** for $(n-2)$ soi **Dep B1** on first **B** for 6 soi
	$n=8$	**B1**	**Dep** on previous **B** marks

Question	Answer	Marks	Guidance
7(a)	$\sin AOQ = \frac{7}{10}$ $POA = \pi - AOQ$ or $14^2 = 10^2 + 10^2 - 200\cos AOB$ oe $POA = \frac{2\pi - AOB}{2}$	**M1**	Allow alternatives, but must be a complete method to find *POA*
	$POA = 2.366195157$ = 2.366 to 3 dp	**A1**	Must see an angle correct to more than 3dp used in order to justify 3 dp
7(b)	Area of sector = $\frac{1}{2}10^2(2.366)$ (118.3)	**B1**	Allow unsimplified. Also allow use of 2.37
	Area of triangle = $\frac{1}{2}10^2\sin 2.366$ (35)	**B1**	Allow unsimplified. Also allow use of 2.37
	Total area = awrt 153	**B1**	Allow greater accuracy
7(c)	Major arc *PB* = 10×2.366	**B1**	Allow unsimplified. Also allow use of 2.37
	$\sin\frac{POA}{2} = \frac{AP/2}{10}$ or $AP^2 = 10^2 + 10^2 - 200\cos POA$	**M1**	For a valid attempt to find *AP* – may be seen in **(a)** or **(b)** but *AP* must be stated in this part.
	$AP = 18.5$	**A1**	Allow awrt 18.5
	Perimeter: major arc *PB* + 20 + *their AP*	**B1**	For plan, may be implied, but must have an attempt to calculate *AP*
	Total perimeter = 62.2	**A1**	Allow awrt 62.2
8(a)	$2x^2 + 2x - 2 = x^2 + 6x - 2$ $x^2 - 4x = 0$ $x(x-4) = 0$ $x = 0,\ x = 4$	**M1**	For obtaining an equation in one variable
		M1	**Dep** for a correct attempt to obtain at least one solution
	$(0, -1)$	**A1**	nfww
	$(4, 19)$	**A1**	nfww
	Mid-point $(2, 9)$ with sufficient detail	**B1**	**AG**