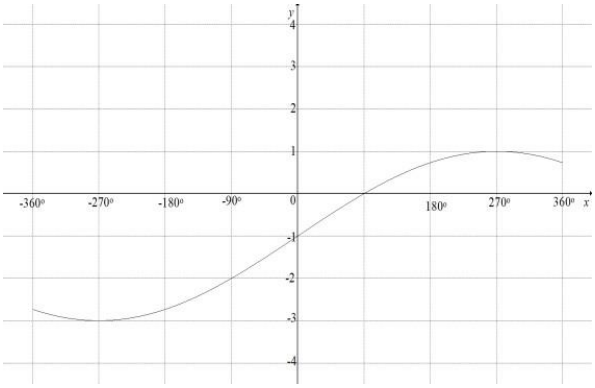
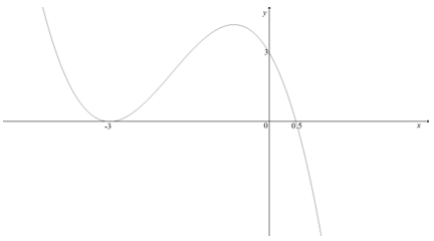
Question	Answer	Marks	Guidance
3		**4**	**B1** for a correct shape, starting in approximately correct places between -2 and -3 and finishing in approximately correct places between 0 and 1, having an amplitude of 2 and crossing the x-axis only once, on the positive x-axis. **B1** for a correct shape and $(0, -1)$ **B1** for a correct shape and a max and a min in approximately correct places. $(270^\circ, 1)$ and $(-270^\circ, -3)$ **B1** for a correct shape crosses at $(90^\circ, 0)$
4(a)	$P\left(-\frac{1}{2}\right): -\frac{a}{8}+\frac{b}{4}-\frac{3}{2}+2=0$	**M1**	Allow one arithmetic error. **Must** be equated to 0 soi Allow unsimplified
	$P(-1): -a+b-3+2=-6$	**M1**	Allow unsimplified **Must** be equated to -6 soi
	$-a+2b+4=0$ oe $-a+b+5=0$ oe	**A1**	For both allow unsimplified
	$a=6, \quad b=1$	**2**	**M1 dep** on at least one previous M1 for attempt to solve *their* simultaneous equations to find at least one of *their* unknowns. **A1** for both.
4(b)	$(2x+1)(3x^2-x+2)$	**2**	**M1** for correct attempt to obtain 2 terms of the quadratic for *their* P(x). Must divide by $(2x + 1)$ **A1** for correct quadratic $(3x^2-x+2)$
	For $3x^2-x+2$, the dicriminant is <0 so only one real root of $-\frac{1}{2}$ oe	**B1**	Must have a valid attempt to evaluate the discriminant.
5(a)(i)	30 240	**B1**	
5(a)(ii)	720	**B1**	the number of passwords with no symbols. Not part of a product
	29 520	**B1**	
5(a)(iii)	$(6\times5)\times6\times(4\times3)=2160$ oe	**2**	**B1** for (6×5) and (4×3) soi

Question	Answer	Marks	Guidance
5(b)	1 of each and 6 police officers = 20	**B1**	For ${}^4C_1 \times {}^5C_1 \times {}^6C_6$ must be evaluated, could be implied by a correct total
	2 of each and 4 police officers = 900	**B1**	For ${}^4C_2 \times {}^5C_2 \times {}^6C_4$ must be evaluated, could be implied by a correct total
	3 of each and 2 police officers = 600	**B1**	For ${}^4C_3 \times {}^5C_3 \times {}^6C_2$ must be evaluated, could be implied by a correct total
	4 of each and no police officers = 5	**B1**	For ${}^4C_4 \times {}^5C_4$ must be evaluated, could be implied by a correct total
	Total = 1525	**B1**	
6(a)	$\mathrm{q}'(x) = -\frac{1}{3}(2(2x-1)(x+3)+2(x+3)^2)$oe	**2**	**M1** for attempt to differentiate, allow one arithmetic slip. **A1** – allow unsimplified.
	$\left[\mathrm{q}'(x) = -\frac{2}{3}\right](3x^2+11x+6)=0$ $x=-3$ and $x=-\frac{2}{3}$	**2**	**Dep M1** for equating *their* $\mathrm{q}'(x)$to zero and attempt to solve *their* 3-term quadratic to get two solutions for x = … **A1** for both x values correct **nfww**
6(b)		**3**	**B1** for correct cubic shape with maximum point in correct quadrant. **B1** for correct cubic shape touching at $(-3,\ 0)$ and passing through $(0.5, 0)$, intercepts must be marked. **B1** for correct cubic shape passing through $(0,\ 3)$intercept must be marked.
6(c)	$k<0$	**B1**	Condone $y<0$
	$x=-\frac{2}{3},\ y=\frac{343}{81}$ or $y=4.23$	**M1**	For finding the value of y at *their* max point. If incorrect must see substitution of *their* $x=-\frac{2}{3}$ **nfww**
	$k>\frac{343}{81}$ or $k>4.23$	**A1**	Condone $y>\frac{343}{81}$ or $y>4.23$