Question	Answer	Marks	Guidance
3	**Alternative**		
	$\ln(y+2) = mx^2 + c$ soi	**(B1)**	
	Gradient = –2.18, $-\frac{109}{50}$ oe	**(B1)**	
	$9.37 = 2.25m + c$ $3.92 = 4.75m + c$	**(M1)**	Use of a correct equation with *their* gradient and *c*
	$c = 14.3,\ 14.28,\ 14.275,\ \frac{571}{40}$	**(A1)**	
	$y = e^{(14.3 - 2.18x^2)} - 2$ oe	**(A1)**	**FT** on *their m* and *c*
4(a)	$n = 16$	**B1**	
	$+\frac{n(n-1)}{2!}\left((-)\frac{x}{2}\right)^2$, ${}^nC_2\left((-)\frac{x}{2}\right)^2$ oe $\frac{n(n-1)}{8} = p,\ p = 30$	**2**	**M1** for attempt at third term allow unsimplified in terms of *n* or *their n*, but not just as part of an expansion unless used to find *p* **A1** for *p*.
	$+\frac{n(n-1)(n-2)}{3!}\left((-)\frac{x}{2}\right)^3$, ${}^nC_3\left((-)\frac{x}{2}\right)^3$ $\frac{n(n-1)(n-2)}{48} = q,\quad q = -70$	**2**	**M1** for attempt at fourth term, allow unsimplified in terms of *n* or *their n*, but not just as part of an expansion unless used to find *q* **A1** for *q*.
4(b)	${}^6C_4\left(\frac{2}{x^2}\right)^2\left(\frac{x}{3}\right)^4$	**B1**	For identifying the correct term and attempting to evaluate.
	$\frac{20}{27}$	**B1**	
5	$\cos\left(2\theta + \frac{\pi}{6}\right) = (\pm)\frac{\sqrt{3}}{2}$ oe or $\tan\left(2\theta + \frac{\pi}{6}\right) = (\pm)\frac{1}{\sqrt{3}}$ oe	**B1**	
	$\theta = -\frac{\pi}{6},\ 0,\ \frac{\pi}{3}$ oe	**4**	**M1** for a correct order of operations, may be implied by one correct solution. **A1** for 1 correct solution. **A1** for a 2nd correct solution **A1** for a 3rd correct solution with no extra solutions in the range. All solutions must be from correct working.

Question	Answer	Marks	Guidance
6(a)	$c=12$	**B1**	
	$\text{p}\left(\frac{1}{3}\right)$: $\frac{a}{27}+\frac{b}{9}+\frac{c}{3}-5=0$ soi	**M1**	Allow one arithmetic or sign error, may substitute in their *c*.
	$\text{p}(2)$: $8a+4b+2c-5=95$	**M1**	Allow one arithmetic or sign error, may substitute in their *c*.
	$a+3b=27$ or $\frac{a}{27}+\frac{b}{9}=1$ oe	**A1**	Allow multiples but *c* needs to have been eliminated and terms with powers evaluated.
	$2a+b=19$ oe	**A1**	Allow multiples but *c* needs to have been eliminated
	$a=6,\ b=7$	**2**	**M1**, **dep** on at least one previous **M1**, for attempt to solve *their* equations in *a* and *b* only, to find *a* or *b*. **A1** for both *a* and *b*.
6(b)	$(3x-1)(2x^2+3x+5)$ cao	**2**	**M1** for attempt at 2 terms in *their* quadratic factor. **A1** for both factors.
	For $2x^2+3x+5=0,$ discriminant is less than zero, so no solutions. [Only solution is $x=\frac{1}{3}$.]	**B1**	Allow other valid arguments, but must be using a correct quadratic factor and an attempt to evaluate the discriminant
7(a)(i)	136 080	**B1**	
7(a)(ii)	(End in 0) 15 120 or ${}^{9}\text{P}_{5}$ or $9\times8\times7\times6\times5$	**B1**	
	(End in 5) 13 440 or $8\times{}^{8}\text{P}_{4}$ or $8\times8\times7\times6\times5$	**B1**	
	Total: 28 560	**B1**	
	Alternative 1		
	(Does not start with 5:) 26 880 or $16\times{}^{8}\text{P}_{4}$	**(B1)**	
	(Starts with 5:) 1680 or ${}^{8}\text{P}_{4}$	**(B1)**	
	Total: 28 560	**(B1)**	