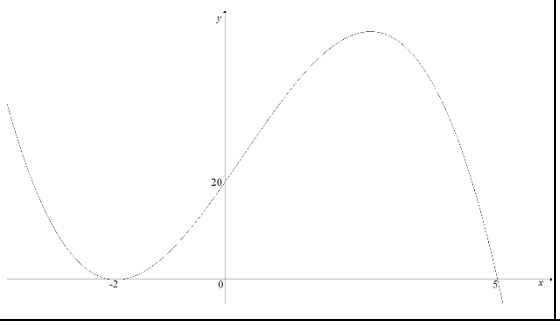
Question	Answer	Marks	Guidance
1	$kx^2+2x+3k-1\ \ [=0]$	**2**	**M1** for attempt to equate equations of the line and curve, re-arrange and equate to zero. Allow one sign error.
	$4=4k\times\ their(3k-1)$ oe	**M1**	**Dep** for attempt to use the discriminant of *their* quadratic equation and solve to obtain *k*.
	$k=\frac{1\pm\sqrt{13}}{6}$ isw	**A1**	
	Alternative method		
	$kx^2+2x+3k-1=0$	**2**	**M1** for attempt to equate equations of the line and curve, re-arrange and equate to zero. Allow one sign error.
	Grad of straight line = -1 Gradient function of curve = $2kx+1$ Substitution to obtain $3k^2-k-1=0$ oe with attempt to solve to obtain *k*	**M1**	**Dep**
	$k=\frac{1\pm\sqrt{13}}{6}$ isw	**A1**	
2(a)	$\frac{dy}{dx}=2(x+2)(5-x)+(-1)(x+2)^2$ or $y=-x^3+x^2+16x+20$ $\frac{dy}{dx}=-3x^2+2x+16$	**2**	**M1** for attempt at differentiation of a product, or expansion and then differentiation. **A1** for all correct
	$(x+2)(8-3x)=0$	**M1**	**Dep** for attempt to solve *their* quadratic $\frac{dy}{dx}=0$
	$x=-2,\ \frac{8}{3}$	**A1**	For both.
2(b)		**3**	**B1** for correctly shaped curve, with maximum point in the first quadrant **B1** for $(5,\ 0)$ and a stationary point at $(-2,\ 0)$, must have a cubic graph. **B1** for $(0,\ 20)$, must have a cubic graph

Question	Answer	Marks	Guidance
2(c)	When $x=\frac{8}{3}$, $y=\frac{1372}{27}$ or awrt 50.8	**M1**	For attempt to find the value of y using *their* $\frac{8}{3}$.
	$k>\frac{1372}{27}$ or awrt 50.8	**A1**	
	$k<0$	**B1**	
3	${}^{10}C_2(2x)^8\left(-\frac{1}{x}\right)^2$ or ${}^{10}C_1(2x)^9\left(-\frac{1}{x}\right)^1$	**M1**	For attempting to find terms which will give terms of x^8 or x^6, allow coefficients. Allow as part of an expansion
	45×256 $\left[x^6\right]$ oe	**A1**	
	$[-]$ 5120 $\left[x^8\right]$	**A1**	
	their(-11520) + *their*(-5120)	**M1**	**Dep**
	–16 640	**A1**	Condone inclusion of x^8
4(a)	$\lg\frac{x^3}{1000y^4}$ oe	**3**	**B1** for $3=\lg1000$ **M1** for correct use of power rule at least once and division rule at least once **A1** cao
4(b)	$\log_x 3=\frac{1}{\log_3 x}$ soi	**B1**	For change of base.
	$2(\log_3 x)^2-5(\log_3 x)+2=0$	**M1**	For attempt to obtain a 3-term quadratic equation, equated to zero. Allow one sign error. May be using a substitution.
	$2\log_3 x=1$ $\log_3 x=2$	**M1**	**Dep** for attempt to solve *their* quadratic equation and a correct attempt to obtain at least one value of x.
	$x=\sqrt{3}$ oe	**A1**	Allow 1.73(2…)
	$x=9$	**A1**	