Topic Y2 (Pre-TT A): Coordinate geometry and binomial [48]
MARKSCHEME

1.

(i)	$(1-2x)^{12} = 1-24x+264x^2$	B1 M1 A1	 3	Obtain 1 and $-24x$ … Attempt x^2 term, including attempt at binomial coeff. Obtain …$264x^2$
(ii)	$(1\times 264)+(3\times -24)=192$	M1 A1√ A1	 3	Attempt coefficient of x^2 from two pairs of terms Obtain correct unsimplified expression Obtain 192
			6	

2.

9 (i)	Gradient = 4	B1		Gradient of 4 soi
	$y-7=4(x-2)$	M1		Attempts equation of straight line through (2, 7) with any gradient
	$y=4x-1$	A1	3	
(ii)	$\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$ $=\sqrt{(2-^-1)^2+(7-^-2)^2}$ $=\sqrt{3^2+9^2}$ $=\sqrt{90}$ $=3\sqrt{10}$	M1 A1 A1	 3	Use of correct formula for d or d^2 (3 values correctly substituted) $\sqrt{3^2+9^2}$ Correct simplified surd
(iii)	Gradient of AB = 3 Gradient of perpendicular line = $-\frac{1}{3}$ Midpoint of AB = $\left(\frac{1}{2},\frac{5}{2}\right)$ $y-\frac{5}{2}=-\frac{1}{3}\left(x-\frac{1}{2}\right)$ $x+3y-8=0$	B1 B1 ft B1 M1 A1 A1	 6	SR Allow B1 for $-\frac{1}{4}$ Attempts equation of straight line through their midpoint with any non-zero gradient $y-\frac{5}{2}=\frac{-1}{3}(x-\frac{1}{2})$ $x+3y-8=0$
			12	

3.

Q	Marking Instructions	AO	Marks	Typical Solution
(a)	Uses binomial theorem to expand bracket – correct unsimplified expression but condone sign error	AO1.1a	M1	$1+\binom{10}{1}(-2x)^1+\binom{10}{2}(-2x)^2$
	Obtains constant term and x term, both correct	AO1.1b	A1	$=1-20x+180x^2...$
	Obtains correct x^2 term	AO1.1b	A1	
(b)	Selects $x = 0.001$	AO3.1a	B1	Substituting $x = 0.001$
	Substitutes 'their' chosen value of x into 'their' expansion from part **(a)** to obtain a 5 decimal place value	AO1.1a	M1	$1 - 0.020 + 0.000180 = 0.98018$
	Gives a correct explanation to confirm that the value found from the calculator is 0.98018 to 5 decimal places which is the same as the value found by using the expansion	AO2.4	A1	$0.998^{10} = 0.980179$ $= 0.98018$ to 5 dp, which matches Carly's value.
	Total		**6**	

4.

(i)	$(2x + 5)^4=(2x)^4 + 4(2x)^3 5 + 6(2x)^2 5^2 + 4(2x)5^3 + 5^4$	M1*	Attempt expansion involving powers of $2x$ and 5 (at least 4 terms)
	$= 16x^4 + 160x^3 + 600x^2 + 1000x + 625$	M1*	Attempt coefficients of 1, 4, 6, 4, 1
		A1dep*	Obtain two correct terms
		A1 **4**	Obtain a fully correct expansion
(ii)	$(2x + 5)^4 – (2x – 5)^4 = 320x^3 + 2000x$	M1	Identify relevant terms (and no others) by sign change oe
		A1 **2**	Obtain $320x^3 + 2000x$ cwo
(iii)	$9^4 – (-1)^4 = 6560$ and $7360 – 800 = 6560$ **A.G.**	B1	Confirm root, at any point
	$320x^3 – 1680x + 800 = 0$	M1	Attempt complete division by $(x – 2)$ or equiv
	$4x^3 – 21x + 10 = 0$	A1√	Obtain quotient of $ax^2 + 2ax + k$, where a is their coeff of x^3
	$(x – 2)(4x^2 + 8x – 5) = 0$	A1	Obtain $(4x^2 + 8x – 5)$ (or multiple thereof)
	$(x – 2)(2x – 1)(2x + 5) = 0$	M1	Attempt to solve quadratic
	Hence $x = ½$, $x = -2½$	A1 **6**	Obtain $x = ½$, $x = -2½$
			SR: answer only is B1 B1
		12	

5.

10 (i)	Centre (-1, 2) $(x+1)^2 - 1 + (y-2)^2 - 4 - 8 = 0$ $(x+1)^2 + (y-2)^2 = 13$ Radius $\sqrt{13}$	B1 M1 A1 3	Correct centre Attempt at completing the square Correct radius <u>Alternative method:</u> Centre $(-g, -f)$ is (-1, 2) B1 $g^2 + f^2 - c$ M1 Radius $= \sqrt{13}$ A1
(ii)	$(2)^2 + (k-2)^2 = 13$ $(k-2)^2 = 9$ $k - 2 = \pm 3$ $k = -1$	M1 M1 A1 3	Attempt to substitute x = -3 into circle equation Correct method to solve quadratic $k = -1$ (negative value chosen)
(iii)	EITHER $y = 6 - x$ $(x+1)^2 + (6 - x - 2)^2 = 13$ $(x+1)^2 + (4 - x)^2 = 13$ $x^2 + 2x + 1 + 16 - 8x + x^2 = 13$ $2x^2 - 6x + 4 = 0$ $2(x-1)(x-2) = 0$ $x = 1, 2$ $\therefore y = 5, 4$ OR $x = 6 - y$ $(6 - y + 1)^2 + (y-2)^2 = 13$ $(7 - y)^2 + (y-2)^2 = 13$ $49 - 14y + y^2 + y^2 - 4y + 4 = 13$ $2y^2 - 18y + 40 = 0$ $2(y-4)(y-5) = 0$ $y = 4, 5$ $\therefore x = 2, 1$	M1 M1 A1 M1 A1 A1 6	Attempt to solve equations simultaneously Substitute into their circle equation for x/y or attempt to get an equation in 1 variable only Obtain correct 3 term quadratic Correct method to solve quadratic of form $ax^2 + bx + c = 0$ $(b \neq 0)$ Both x values correct Both y values correct <u>or</u> one correct pair of values **www** B1 second correct pair of values B1 SR **T & I** M1 A1 One correct x (or y) value A1 Correct associated coordinate
		12	