Topic Y2: Coordinate geometry and binomial Post-TT A) [44] MARKSCHEME

1.

		Midpoint of AB is $\left(\frac{-2+3}{2}, \frac{6+-8}{2}\right)$	M1	Correct method to find midpoint – can be implied by one correct value	**NB – "correct" answer can be found with wrong mid-pt. Check working thoroughly.**
		$\left(\frac{1}{2}, -1\right)$	A1		
		Gradient of given line = $\frac{1}{3}$	B1	Must be stated or used – just rearranging the equation is not sufficient	
		Gradient of $l = -3$	B1FT	Use of $m_1 m_2 = -1$ (may be implied), allow for any initial non-zero numerical gradient	
		$y+1=-3\left(x-\frac{1}{2}\right)$	M1	Correct equation for line, any non-zero numerical gradient, through their $\left(\frac{1}{2}, -1\right)$	
			A1	Correct equation in any three-term form	
		$6x + 2y - 1 = 0$	A1 [7]	$k(6x + 2y - 1) = 0$ for integer k www	Must include "= 0"

2.

Question	Scheme	Marks	AOs
7(a)	$\left(2-\frac{x}{2}\right)^7 = 2^7 + \binom{7}{1}2^6.\left(-\frac{x}{2}\right) + \binom{7}{2}2^5.\left(-\frac{x}{2}\right)^2 + \ldots$	M1	1.1b
	$\left(2-\frac{x}{2}\right)^7 = 128 + \ldots$	B1	1.1b
	$\left(2-\frac{x}{2}\right)^7 = \ldots -224x + \ldots$	A1	1.1b
	$\left(2-\frac{x}{2}\right)^7 = \ldots + \ldots + 168x^2 (+\ldots)$	A1	1.1b
		(4)	
(b)	Solve $\left(2-\frac{x}{2}\right) = 1.995$ so $x = 0.01$ and state that 0.01 would be substituted for x into the expansion	B1	2.4
		(1)	
		(5 marks)	

3.

(i)	Length AC = $\sqrt{(8-5)^2+(2-1)^2}$ $=\sqrt{3^2+1^2}$ $=\sqrt{10}$	M1 A1		Uses $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $\sqrt{10}$ ($\pm\sqrt{10}$ scores A0)
	Length AB = $\sqrt{(p-5)^2+(7-1)^2}$ $=\sqrt{(p-5)^2+36}$	A1		$\sqrt{(p-5)^2+(7-1)^2}$
	$\sqrt{(p-5)^2+36}=2\sqrt{10}$ $p^2-10p+25+36=40$	M1		AB = 2AC (with algebraic expression) used
	$p^2-10p+21=0$ $(p-7)(p-3)=0$	M1		Obtains 3 term quadratic = 0 suitable for solving <u>or</u> $(p-5)^2=4$
	$p=7,3$	A1 A1	7	$p=7$ $p=3$ **SR <u>If no working seen</u>, and one correct value found, award B2 in place of the final 4 marks in part (i)**
(ii)	$7=3x-14$ $x=7$	M1 A1		Correct method to find x $x=7$
	(5, 1) (7, 7)	M1		Use $\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$
	Mid-point (6, 4)	A1√	4	(6, 4) or correct midpoint for their AB <u>Alternative method</u> y coordinate of midpoint = 4 M1 A1 sub 4 into equation of line M1 obtains $x=6$ A1

4.

9(i)	Gradient of AB $= \frac{-2-1}{-5-3}$	B1	$\frac{3}{8}$ oe
	$= \frac{3}{8}$		
	$y-1=\frac{3}{8}(x-3)$	M1	Equation of line through either A or B, any non-zero numerical gradient
	$8y-8=3x-9$		
	$3x-8y-1=0$	A1 3	Correct equation in correct form
(ii)	$\left(\frac{-5+3}{2}, \frac{-2+1}{2}\right)$	M1	Uses $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$
	$=(-1, -\frac{1}{2})$	A1 2	$(-1, -\frac{1}{2})$
(iii)	$AC=\sqrt{(-5+3)^2+(-2-4)^2}$	M1	Uses $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
	$=\sqrt{2^2+6^2}$		
	$=\sqrt{40}$	A1	$\sqrt{40}$
	$=2\sqrt{10}$	A1 3	Correctly simplified surd
(iv)	Gradient of AC $=\frac{-2-4}{-5+3} = 3$	B1	3 oe
	Gradient of BC $=\frac{4-1}{-3-3} = -\frac{1}{2}$	B1	$-\frac{1}{2}$ oe
	$3\times-\frac{1}{2}\neq-1$ so lines are not	M1	Attempts to check $m_1 \times m_2$
	perpendicular	A1 4	Correct conclusion www
		12	

5.

(i)	$6k^2a^2=24$	M1*	Obtain at least two of 6, k^2, a^2
	$k^2a^2=4$	M1dep*	Equate $6k^ma^n$ to 24
	$ak=2$ **A.G.**	A1 **3**	Show $ak=2$ convincingly – no errors allowed
(ii)	$4k^3a=128$	B1	State or imply coeff of x is $4k^3a$
	$4k^3\left(\frac{2}{k}\right)=128$	M1	Equate to 128 and attempt to eliminate a or k
	$k^2=16$	A1	Obtain $k=4$
	$k=4$, $a=\frac{1}{2}$	A1 **4**	Obtain $a=½$
			SR B1 for $k=\pm4$, $a=\pm\frac{1}{2}$
(iii)	$4\times4\times\left(\frac{1}{2}\right)^3=2$	M1	Attempt $4\times k\times a^3$, following their a and k (allow if still in terms of a, k)
		A1 **2**	Obtain 2 (allow $2x^3$)
		9	