7 **Mark Scheme:**

(i)	Find gradient of AC	M1	
	Find gradient of BC	M1	
	Apply $m_1 m_2 = -1 \Rightarrow AC \perp BC$.	A1	**[3]**
(ii)	Find centre of circle	M1	
	Find radius	M1	
	Equation of circle: $(x-3)^2 + (y-4)^2 = 25$	A1	**[3]**

Suggested Solution:

(i) Gradient of AC = $\dfrac{4-(-1)}{-2-3} = -1$

Gradient of BC = $\dfrac{4-(-1)}{8-3} = 1$

Since $m_{AC}m_{BC}$ = -1, $AC \perp BC$. **(ans)**

(ii) AB is the diameter of the circle

Center of circle = midpoint of AB = $\left(\dfrac{8-2}{2}, \dfrac{4+4}{2}\right) = (3,4)$

Radius = $\sqrt{(-2-3)^2 + (4-4)^2} = 5$

Equation of circle: $(x-3)^2 + (y-4)^2 = 25$ **(ans)**

8 **Mark Scheme:**

(i)	$2^5 + {}^5C_1 2^4(-4x) + {}^5C_2 2^3(-4x)^2$		
	$32 - 320x + 1280x^2$	B3	**[3]**
(ii)	$32a = 96$, $a=3$	B1	
	$-320a + 32b = -1120$	M1	
	$b = -5$	A1	
	$1280a - 320b = c$	M1	
	$c = 5440$	A1	**[5]**

Suggested Solution:

(ii) $(a + bx)(2 - 4x)^5 = 96 - 1120x + cx^2 + \ldots$

$(a + bx)(32 - 320x + 1280x^2 + ...) = 96 - 1120x + cx^2 + ...$

$32a - 320ax + 1280ax^2 + 32bx - 320bx^2 + 1280bx^3 + ... = 96 - 1120x + cx^2 + ...$

Comparing coefficients

$32a = 96 \Rightarrow a = 3$ **(ans)**

$-320a + 32b = -1120 \Rightarrow b = -5$ **(ans)**

$1280a - 320b = c \Rightarrow c = 5440$ **(ans)**

9 <u>**Mark Scheme:**</u>

(i)	$\ln y = mx^2 + c$	M1
	$m = -2$	A1
	Substitute $\ln y = 2$, $x^2 = 1$ into $\ln y = mx^2 + c \Rightarrow c = 4$	A1
	$y = e^{-2x^2+4}$	A1 **[4]**
(ii)	Applies *lg* to both sides of the equation	M1
	Applies rules of logarithms $[\log xy = \log x + \log y]$	M1
	Applies rules of logarithms $[\log_a x^r = r\log_a x]$	M1
	$Y = \lg y$, $m = 2\lg b$, $X = x$, $c = \lg a$	A1 **[4]**

<u>**Suggested Solution:**</u>

(i) $\ln y = mx^2 + c \quad \Rightarrow \quad m = \dfrac{-14-2}{9-1} = -2$

Substitute $\ln y = 2$, $x^2 = 1$ into $\ln y = mx^2 + c$:

$2 = (-2)(1) + c \Rightarrow c = 4$

$\ln y = -2x^2 + 4 \quad \Rightarrow \quad y = e^{-2x^2+4}$ **(ans)**

(ii) $y = ab^{2x} \Rightarrow \lg y = \lg ab^{2x} \Rightarrow \lg y = \lg a + \lg b^{2x} \Rightarrow \lg y = 2x\lg b + \lg a$

$Y = \lg y$ **,** $m = 2\lg b$ **,** $X = x \;\; c = \lg a$ **(ans)**

10 <u>**Mark Scheme:**</u>

(i)	Applies quotient or product rule	M1	
	$\dfrac{dy}{dx} = \dfrac{26}{(x+5)^2}$	A1	
	Numerator ≠ 0 for any value of $x \rightarrow$ No turning points.	B1√	**[3]**
(ii)	$P\,(\dfrac{1}{5}, 0)$	B1	