11 The lines $x = 0$, $x = 4$, $y = 3$ and $y = -1$ are tangents to a circle.

(a) Find the equation of the circle. [3]

The line $y = 2x + a$, where a is a constant, is also a tangent to the circle.

(b) Show that $5x^2 + 4(a-2)x + (a-1)^2 = 0$, and hence find the possible values of a. Give your answers in exact form. [4]

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12 **(a)** Write down the coefficient of x^r in the binomial expansion of $(2+x)^{59}$. [1]

(b) For this expansion, find the value of r for which the coefficient of x^r is equal to the coefficient of x^{r+1}. [4]