Find the center and the radius of the circle given by the equation

\[ x^2 - 6x + y^2 + 4y = 12. \]

Solution. Complete the two squares by adding 9 + 4 = 13 to both sides to obtain

\[ x^2 - 6x + 9 + y^2 + 4y + 4 = 12 + 9 + 4 \]

which is equivalent to

\[ (x - 3)^2 + (y + 2)^2 = 25, \]

so the center is (3, −2) and the radius is 5.