Write the standard equation for each of the following circles:

64. **a.**

   ![Graph of circle a.](image)

   If we manage to identify the coordinates of the center and the length of the radius, then we will have all of the information (i.e., \(h, k\) & \(r\)) needed to input into the standard form equation of a circle...

   a. In the first graph we see that the center has an \(x\)-coordinate of zero (i.e., \(h = 0\)), has negative one as its \(y\)-coordinate (i.e., \(k = -1\)), and the radius is four units in length (i.e., \(r = 4\)). Hence we can substitute these three values into the equation, \((x - h)^2 + (y - k)^2 = r^2\), to get:

   \[
   (x - 0)^2 + (y - (-1))^2 = 4^2
   \]

   which simplifies as

   \[
   x^2 + (y + 1)^2 = 16
   \]

   ![Equation for circle a.](image)

64. **b.**

   ![Graph of circle b.](image)

   b. In the second graph we observe that the center has coordinates \((h,k) = (1,3)\), and that the length of the radius is the distance between this center point and the origin \((0,0)\). We may use the distance formula to find \(r\) as follows...

   \[
   r = \sqrt{(1-0)^2 + (3-0)^2} \\
   = \sqrt{1^2 + 3^2} \\
   = \sqrt{10}
   \]

   Now we can input the three values into the equation, \((x - h)^2 + (y - k)^2 = r^2\), to obtain:

   \[
   (x - 1)^2 + (y - 3)^2 = (\sqrt{10})^2
   \]

   which simplifies as

   \[
   (x - 1)^2 + (y - 3)^2 = 10
   \]