**Solution 5,**

Given: Centre at \((3, 5)\) and tangent to \(y = -1\)

Find: Standard form and General form of Circle.

Step 1. Put given information on \(x-y\) coordinate plane, so \(r = 6\) units

(\(r\) : the circle tangent to \(y = -1\))

Step 2. The standard form of circle: \((x - 3)^2 + (y - 5)^2 = r^2\)

\[
\Rightarrow (x - 3)^2 + (y - 5)^2 = 6^2
\]

\[
\Rightarrow (x - 3)^2 + (y - 5)^2 = 36
\]

Step 3. Expand \((x - 3)^2 + (y - 5)^2 = 36\)

\[
\Rightarrow x^2 - 6x + 9 + y^2 - 10y + 25 = 36
\]

Simplify: \(x^2 + y^2 - 6x - 10y = 2\)

General form of Circle:

\[
x^2 + y^2 - 6x - 10y - 2 = 0
\]
Solution #6,

Given: Concentric with the circle $x^2+y^2-6y-7=0$, the circle passes through $(2,3)$


Step 1. Find the center by converting the given General form to standard form (both circles have same center).

$x^2+y^2-6y-7=0 \rightarrow$

$x^2+(y-3)^2=7+3 \rightarrow$

$x^2+(y-3)^2=4^2 \rightarrow$ Centre at $(0,3), r=4$

Step 2. The circle we are looking for passes through $(2,3)$

So, $(x-0)^2+(y-3)^2=r_x^2$

$(2-0)^2+(3-3)^2=r_x^2 \rightarrow a^2=r_x^2 \rightarrow r_x=2$

\[\therefore \text{the Standard form:} \quad x^2+(y-3)^2=2^2\]

$x^2+(y-3)^2=4$

Step 3. Expand and simplify:

$x^2+(y-3)^2=4 \rightarrow$

$x^2+y^2-6y+9=4 \rightarrow$

$x^2+y^2-6y+5=0 \quad \text{General form}$
Solution #7,

Given: the inner pipe : \(2.00 x^2 + 2.00 y^2 = 8.00\)
      the outer pipe : \(3.00 x^2 + 3.00 y^2 = 15.9\)

Find: the thickness of the pipe in Centimeter.

Step 1. Simplify \(2.00 x^2 + 2.00 y^2 = 8.00 \rightarrow (\div 2.00 \text{ for both side})\)
      \(\rightarrow x^2 + y^2 = 4.00\)
      \(\rightarrow x^2 + y^2 = z^2 \rightarrow \text{inner} = 2\text{cm}\)

Step 2. Simplify \(3.00 x^2 + 3.00 y^2 = 15.9 \rightarrow (\div 3.00 \text{ for both side})\)
      \(\rightarrow x^2 + y^2 = (\sqrt{5.3})^2 \rightarrow \text{outer} = \sqrt{5.3} \approx 2.30\)

Step 3. the thickness of the pipe:
      \(\text{outer} - \text{inner} = 2.30 - 2.00 = 0.30\text{cm}\)

:. the thickness of the pipe is 0.30 cm.