

Lines $3x - 4y + 8 = 0$ and $3x + 4y - 32 = 0$ intersect at the point $(4,5)$. Since the angle between them is 90° the center of the inscribed circle lies on the horizontal line $y = 5$.

Thus center of the circle is $(x_0, 5)$, x_0 is unknown. Distance to the line $3x - 4y + 8 = 0$ equals to

$$\frac{3}{5}x_0 - \frac{4}{5} \cdot 5 + 8 = \frac{3}{5}x_0 + 4$$

Distance to the line $x = 8$ equals to

$$8 - x_0$$

We have an equation:

$$\frac{3}{5}x_0 + 4 = 8 - x_0$$

$$x_0 = \frac{5}{2}$$

So center of the circle is $\left(\frac{5}{2}, 5\right)$ and radius is $R = 8 - \frac{5}{2} = \frac{11}{2}$

So equation of the inscribed circle is

$$\left(x - \frac{5}{2}\right)^2 + (y - 5)^2 = \frac{121}{4}$$