## Distance of a point from a line

Given a point $(p,q)$ and a line $ax+by+c=0$ the distance of the point from the line is $\dfrac{ap+bq+c}{\sqrt{a^2+b^2}}$

- How could you prove this? (See below for a proof without words)

This formula would allow you to answer the following question:

Find the equation of the circle, centre $(4,-7)$ which touches the line $3x+4y-9=0$

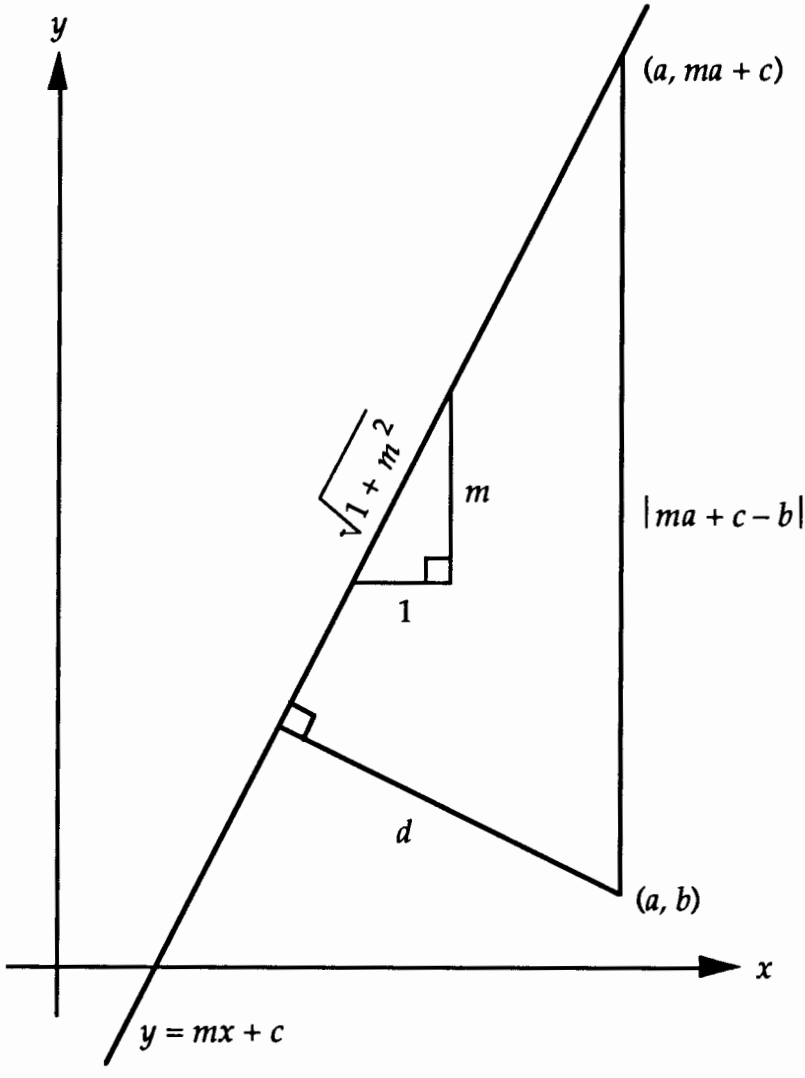
Since the radius of the circle is the distance of the point from the line:

then the radius is $\left|\dfrac{3\times 4+4\times(-7)-9}{\sqrt{3^2+4^2}}\right|=\dfrac{25}{5}=5$

Therefore the equation is $(x-4)^2+(y+7)^2=5^2$

You will find that solving the equations of the line and the circle simultaneously gives repeated roots.

# The Distance Between a Point and a Line




$$\frac{d}{1} = \frac{|ma + c - b|}{\sqrt{1 + m^2}}$$

—R. L. Eisenman