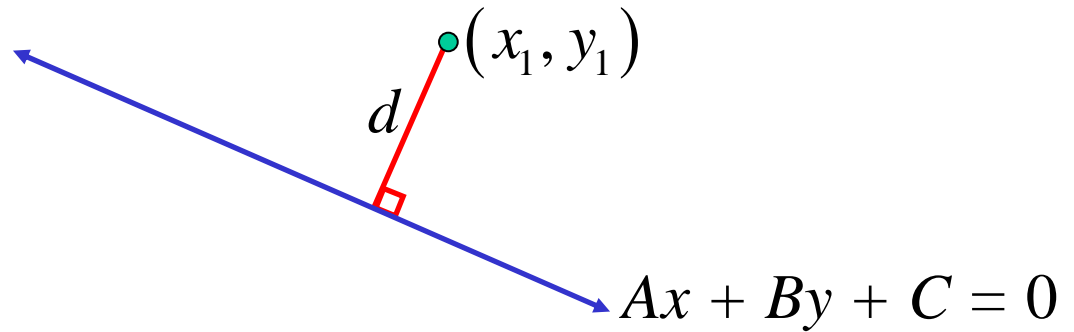


Perpendicular Distance

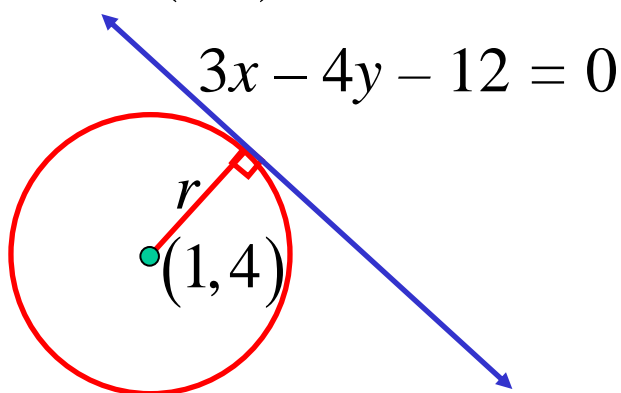
Formula

The shortest distance from a point to a line is the **perpendicular distance**.

$$d = \frac{|Ax_1 + By_1 + C|}{\sqrt{A^2 + B^2}}$$



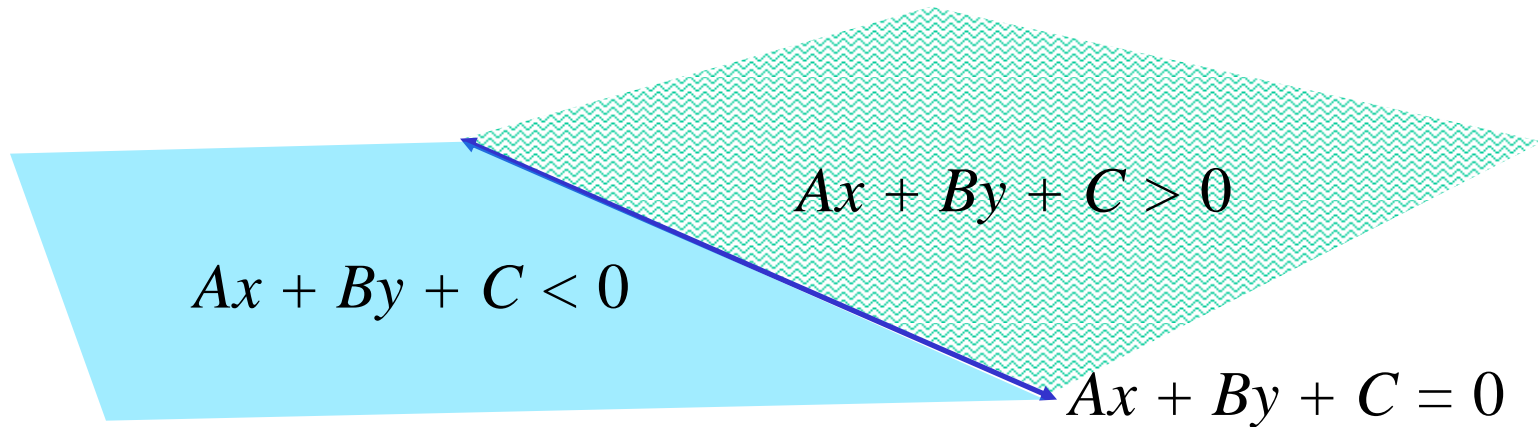
e.g. Find the equation of the circle with tangent $3x - 4y - 12 = 0$ and centre $(1, 4)$.



$$\begin{aligned} r &= \frac{|3(1) - 4(4) - 12|}{\sqrt{3^2 + (-4)^2}} \\ &= \frac{25}{\sqrt{25}} \\ &= 5 \text{ units} \end{aligned}$$

\therefore the circle is
 $(x - 1)^2 + (y - 4)^2 = 25$

If $(Ax_1 + By_1 + C)$ has different signs for different points, they are on different sides of the line.



**Exercise 5E; 1b, 2cf, 5a, 6a, 7bd, 8b,
9abc, 10, 13, 14, 18***