

# Geometria analitica

Retta

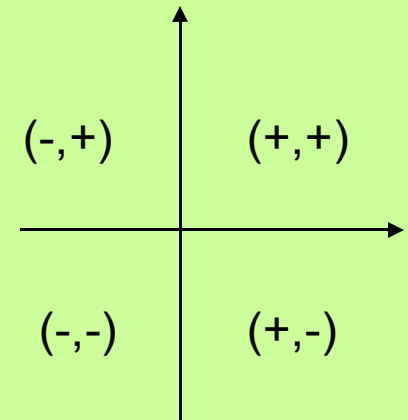
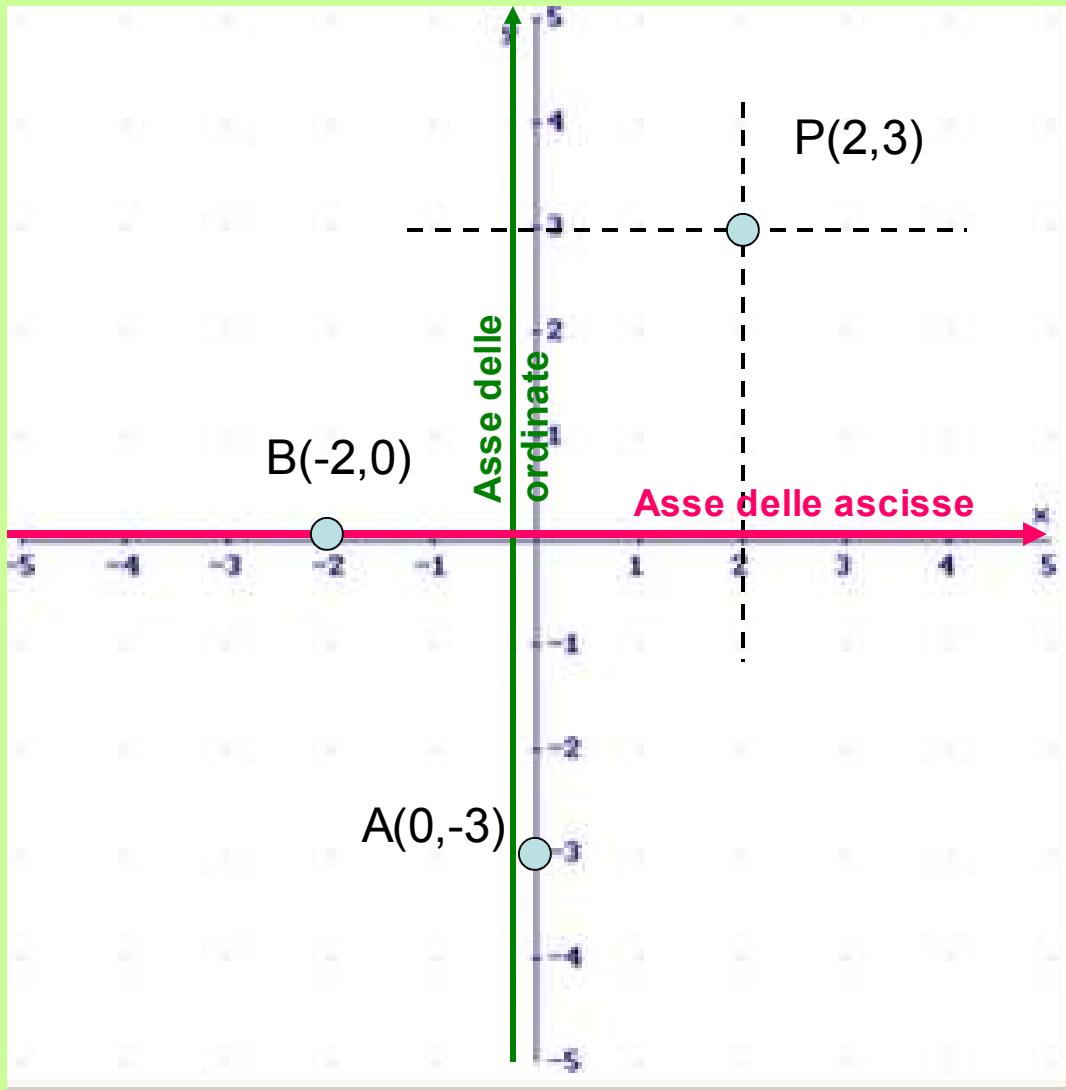
Circonferenza

Parabola

Ellisse

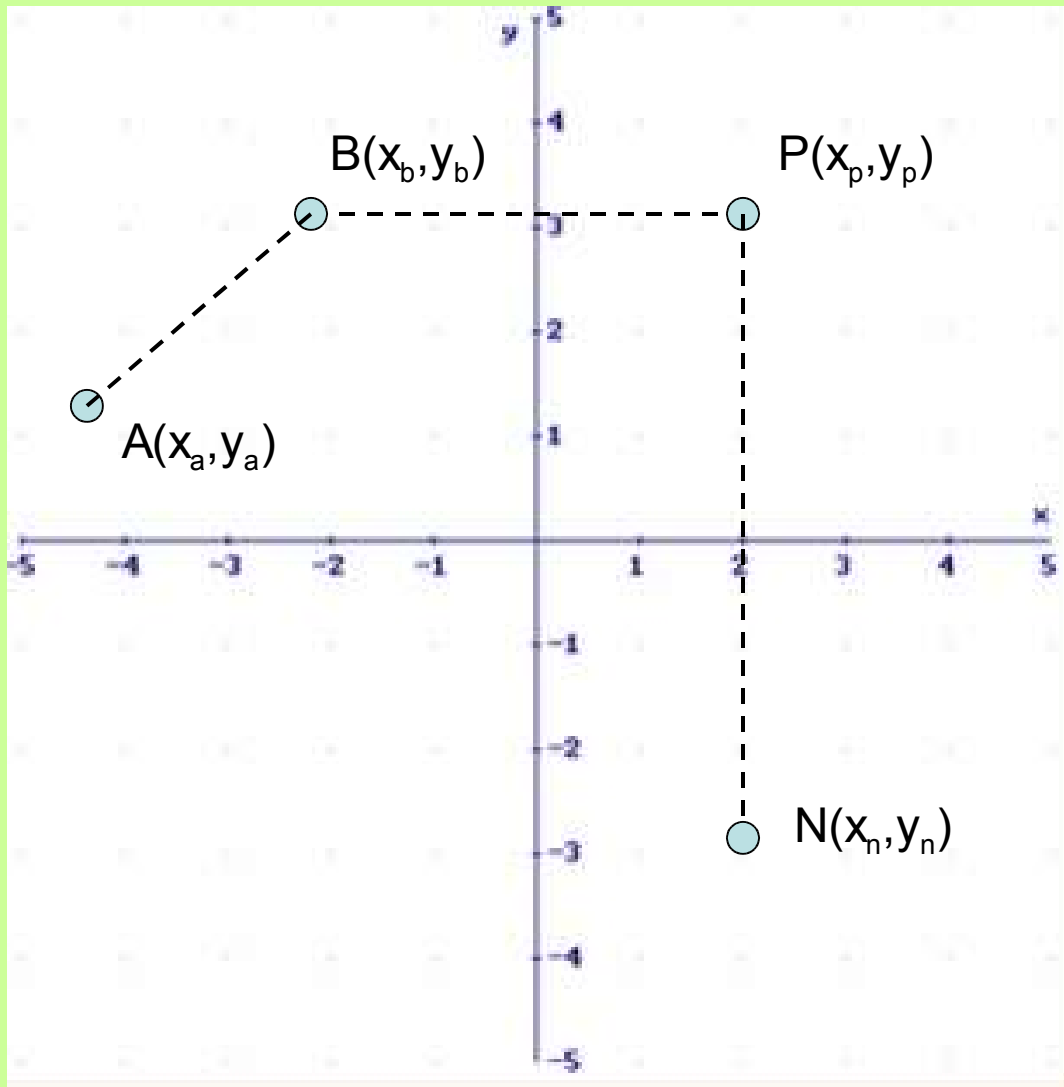
Iperbole

# Piano cartesiano



RETTA

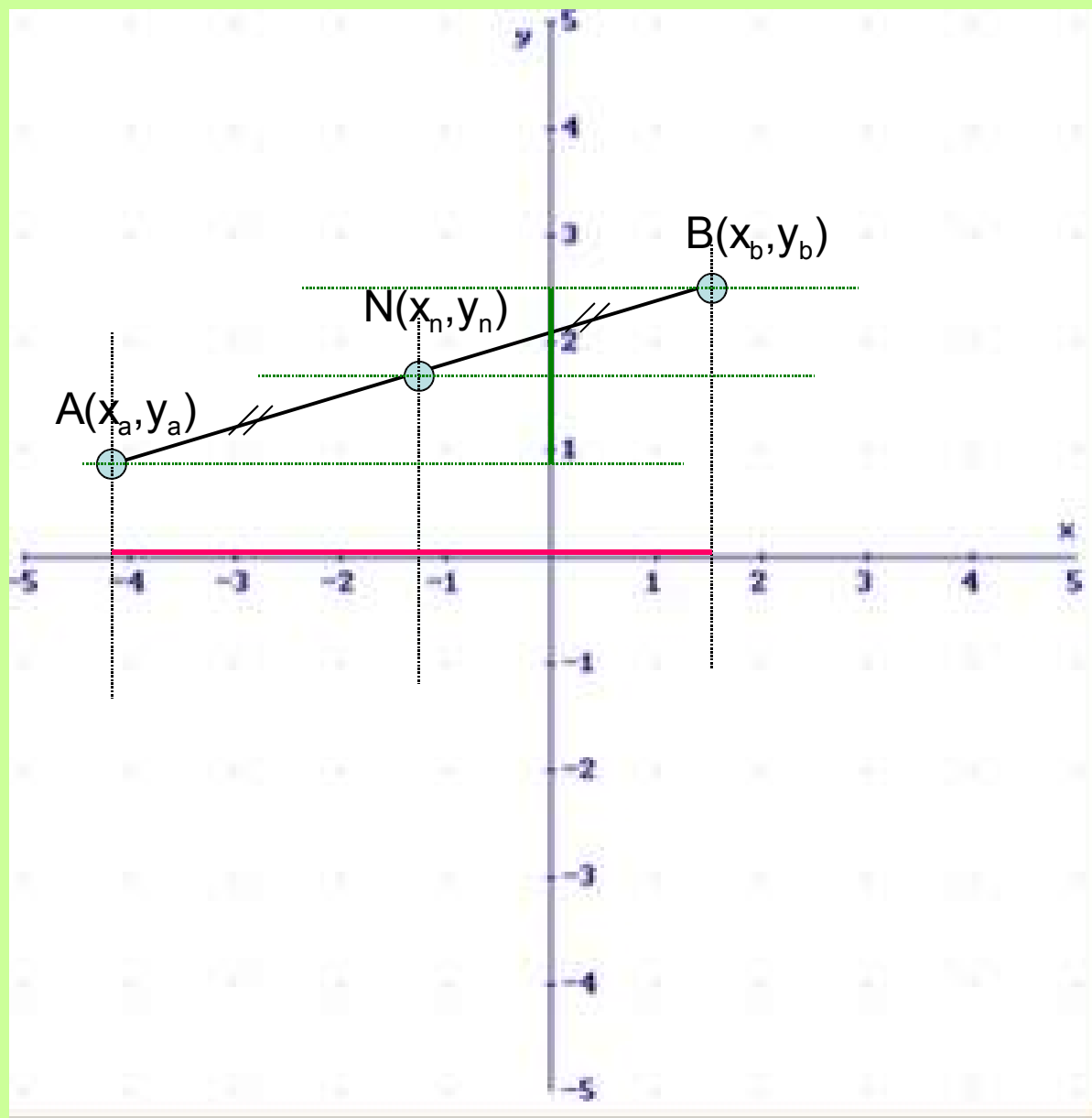
# Distanza tra due punti



$$\overline{BP} = |x_p - x_b|$$

$$\overline{NP} = |y_p - y_n|$$

$$\overline{AB} = \sqrt{(x_a - x_b)^2 + (y_a - y_b)^2}$$



## Punto medio di un segmento

$$x_n = \frac{x_a + x_b}{2}$$

$$y_n = \frac{y_a + y_b}{2}$$

# Baricentro di un triangolo

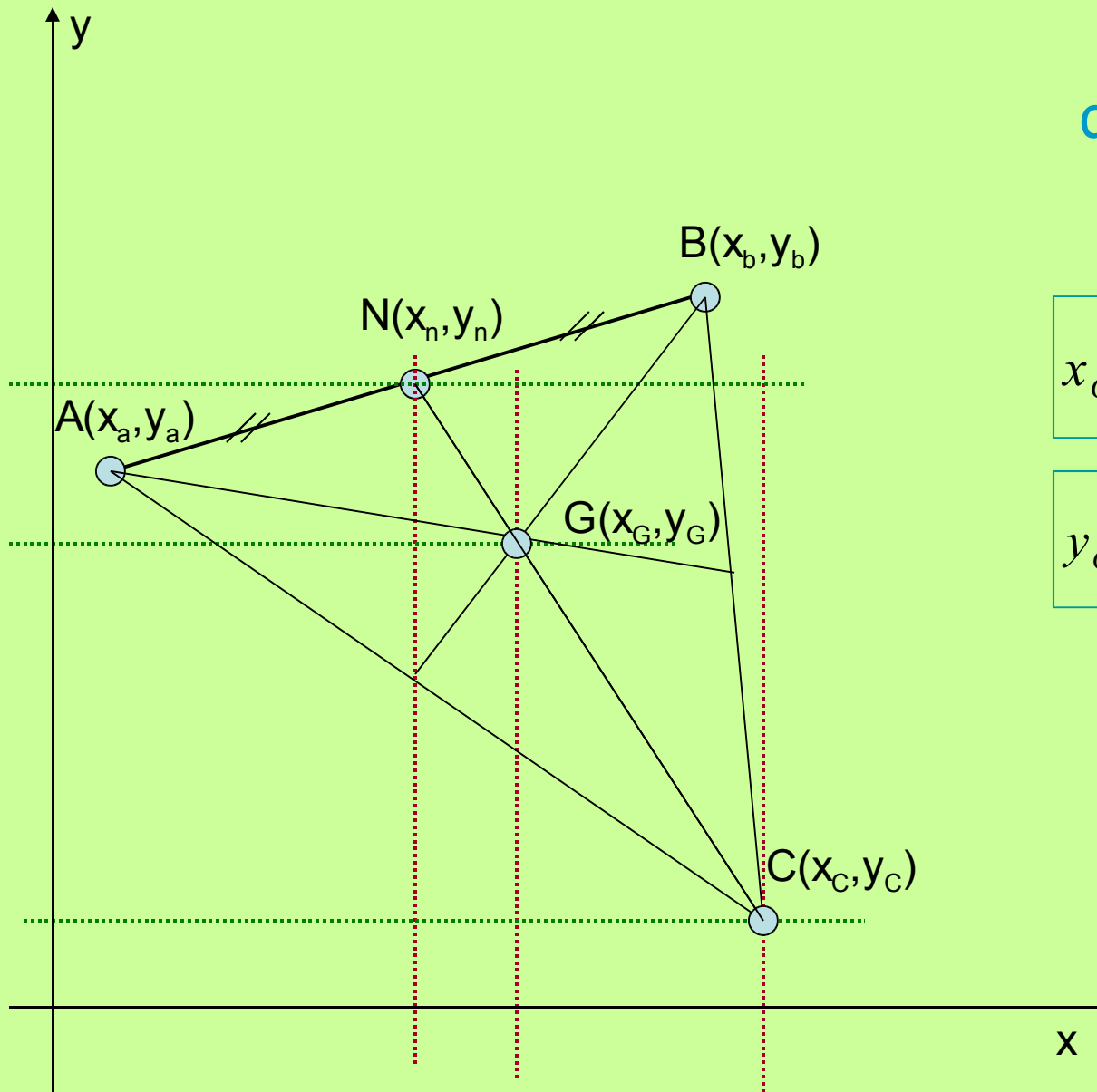
$$x_G = \frac{x_a + x_b + x_c}{3}$$

$$y_G = \frac{y_a + y_b + y_c}{3}$$

$$\overline{CG} = 2\overline{NG}$$

$$\overline{NG} = \frac{1}{3}\overline{NC}$$

$$\overline{GC} = \frac{2}{3}\overline{NC}$$

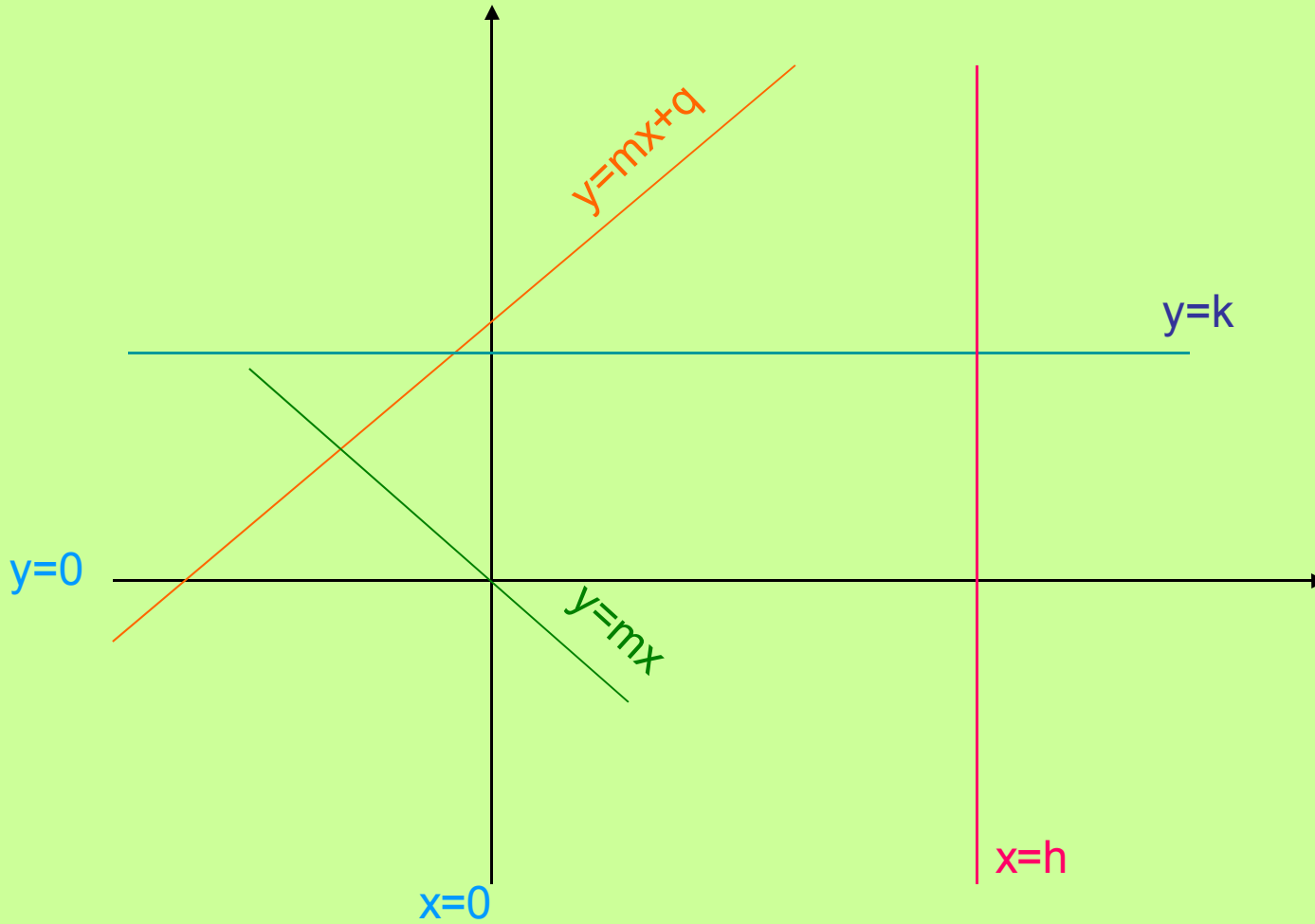


*pina di vito*

RETTA

# Retta

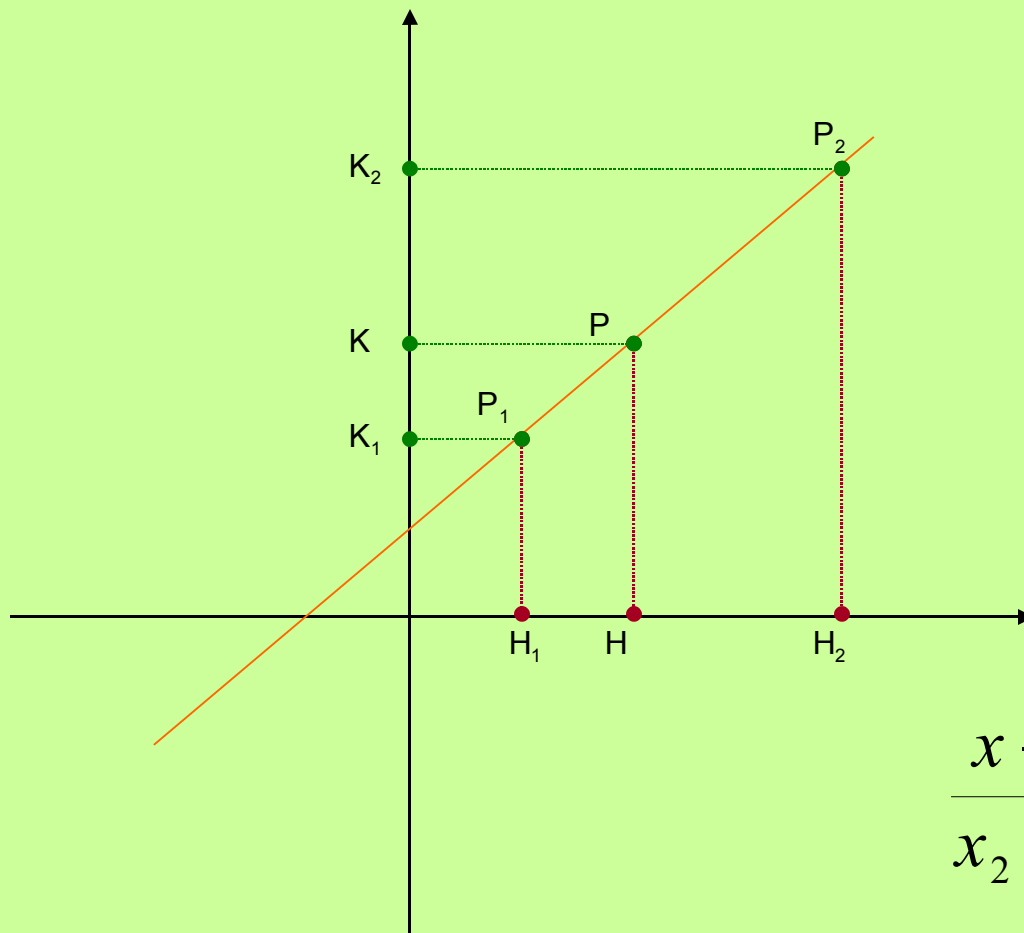
luogo geometrico dei punti del piano allineati fra loro



RETTE

# Condizione di allineamento

considero tre punti allineati e le loro proiezioni sugli assi



Per il teorema di Talete

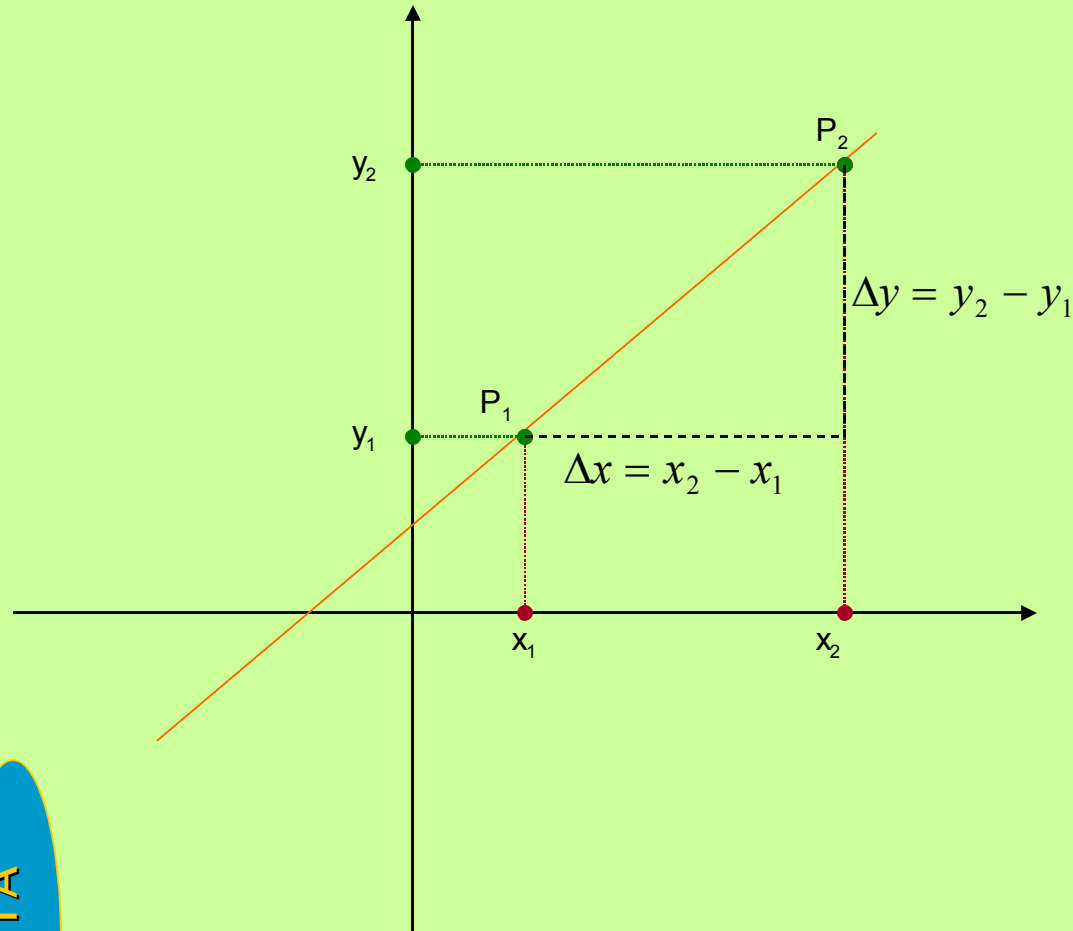
$$\frac{H_1H}{H_1H_2} = \frac{P_1P}{P_1P_2}$$

$$\frac{K_1K}{K_1K_2} = \frac{P_1P}{P_1P_2}$$

$$\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1}$$

# Dalla condizione di allineamento alla equazione della retta

$$\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1}$$



$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1} (x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

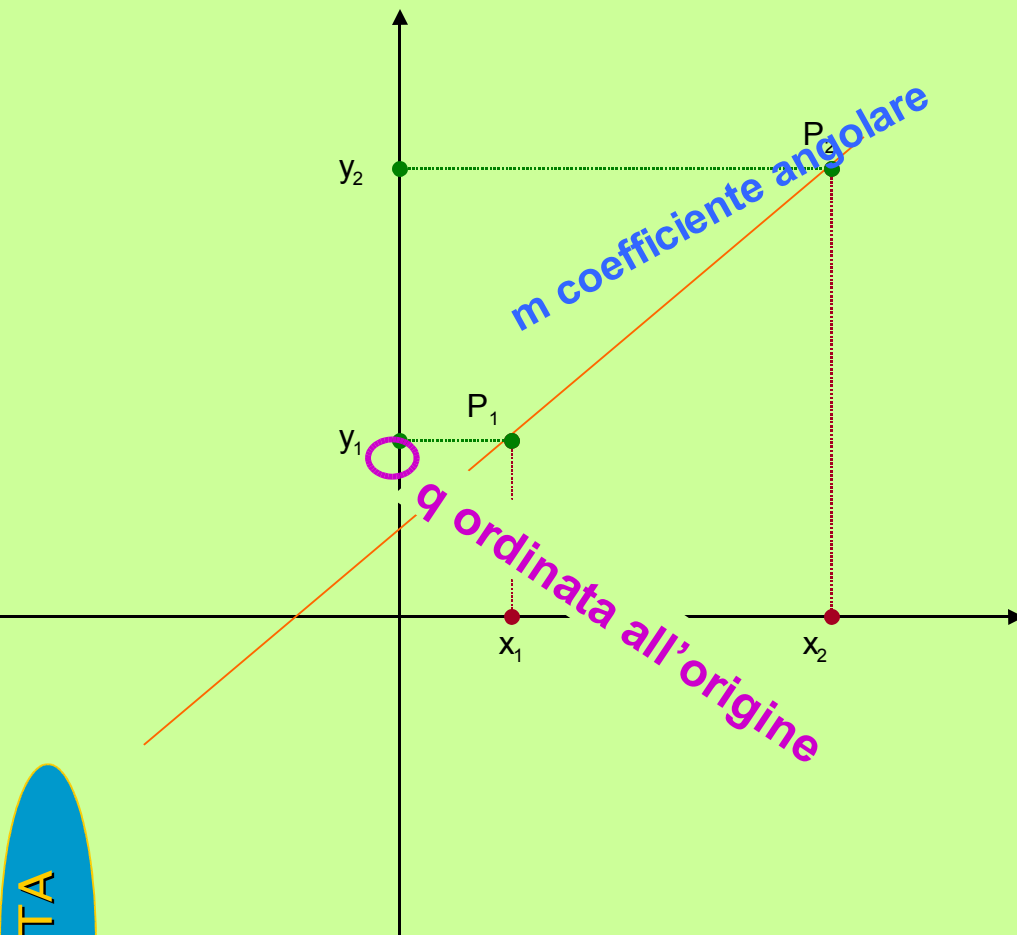
$$y - y_1 = m(x - x_1)$$

$$y = mx + q$$

RETTA

# Equazione della retta in forma implicita

$$ax + by + c = 0$$



$$m = -\frac{a}{b}$$

$$q = -\frac{c}{b}$$

$$y = -\frac{a}{b}x - \frac{c}{b}$$

$$y = mx + q$$

$b \neq 0$

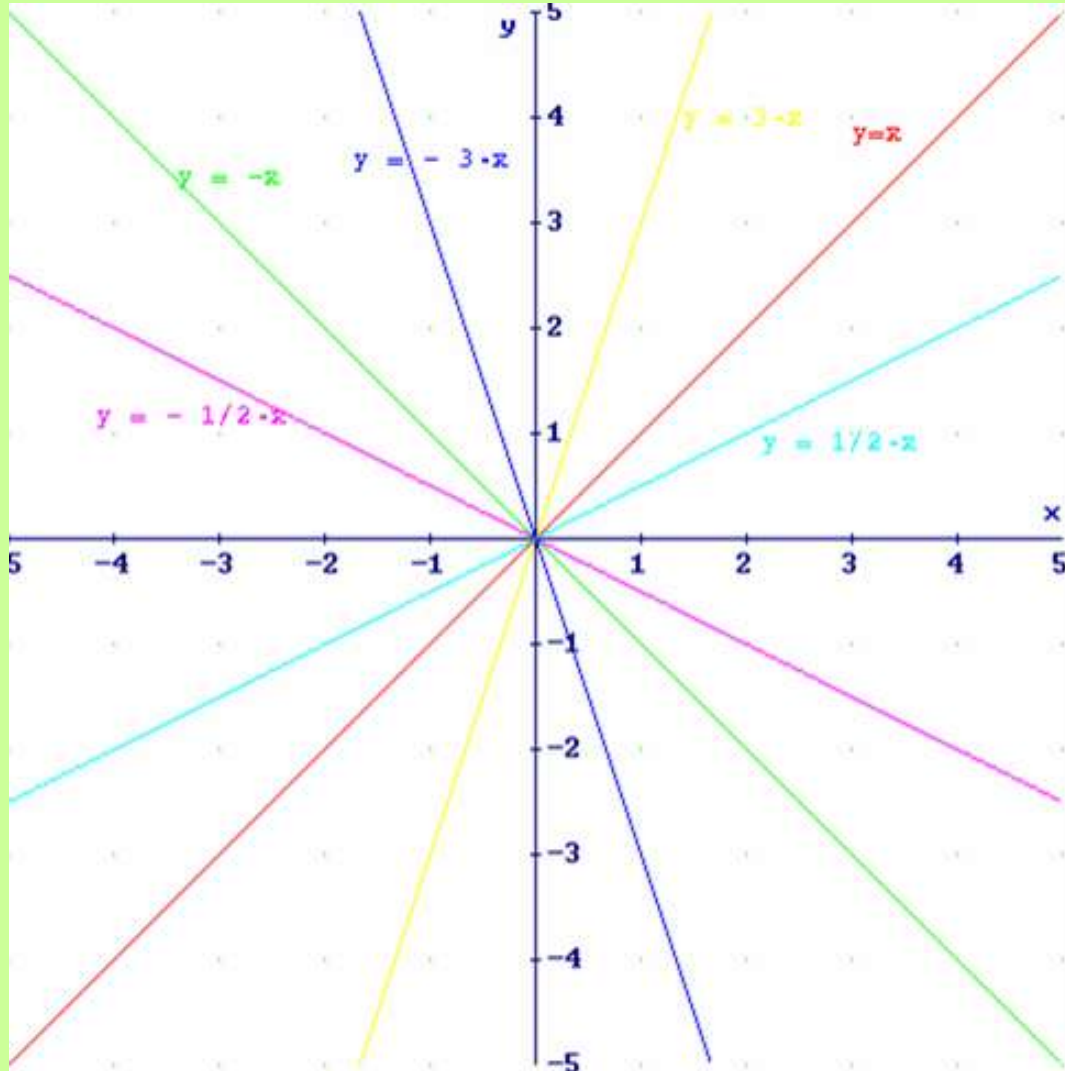
RETTA

# Fascio di rette passanti per l'origine

$$y = mx$$

$$m < -1 \qquad m > 1$$

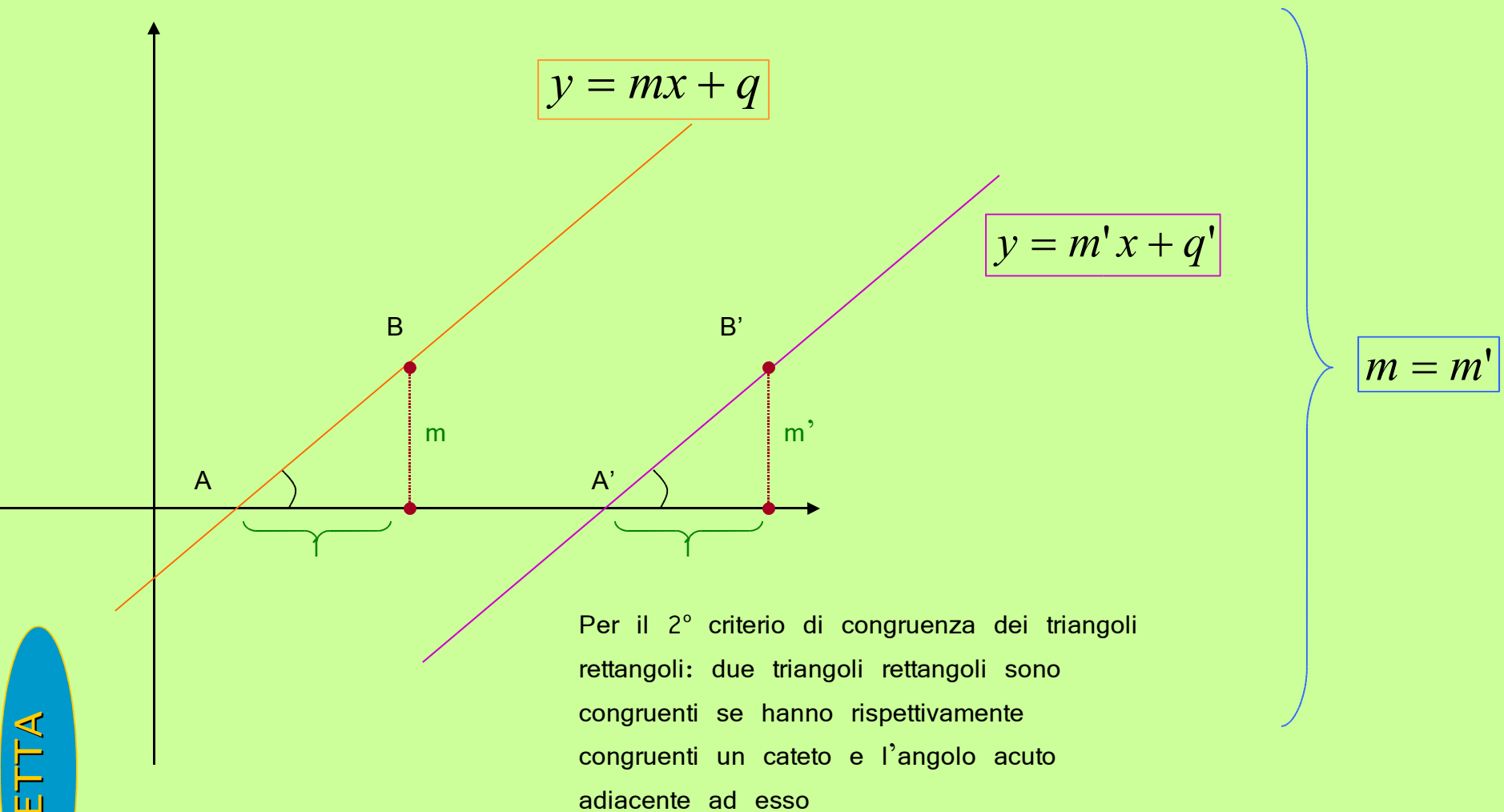
$$-1 < m < 0$$



$$0 < m < 1$$

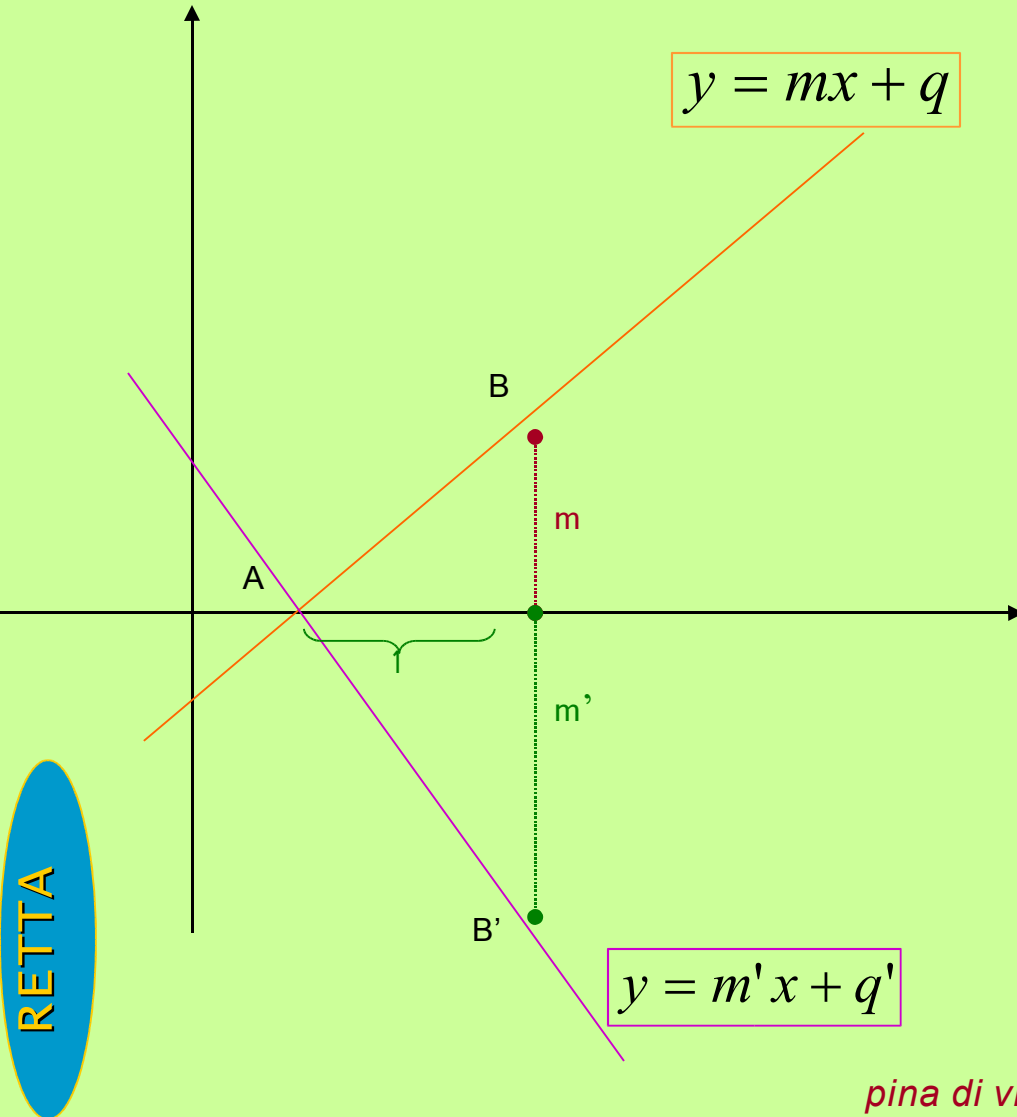
RETTA

# Rette parallele



RETTA

# Rette perpendicolari: $s \perp r$



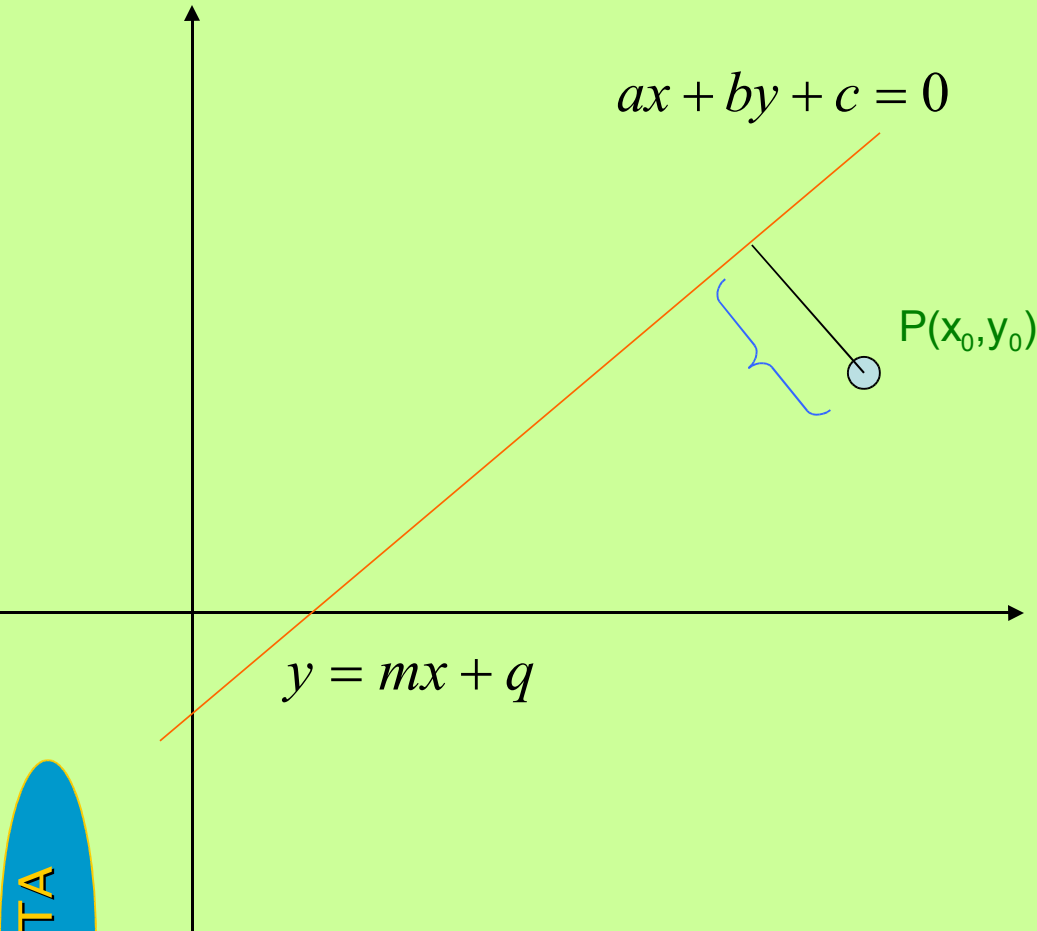
A punto della retta  $r$  di ordinata nulla

Per il 2° teorema di Euclide

$$|m \cdot m'| = 1^2$$

$$m = -\frac{1}{m'}$$

# Distanza punto-retta $d(P,s)$



$$d(P, s) = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}}$$

$$d(P, s) = \frac{|mx_0 - y_0 + q|}{\sqrt{1 + m^2}}$$

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# Asse del segmento AB

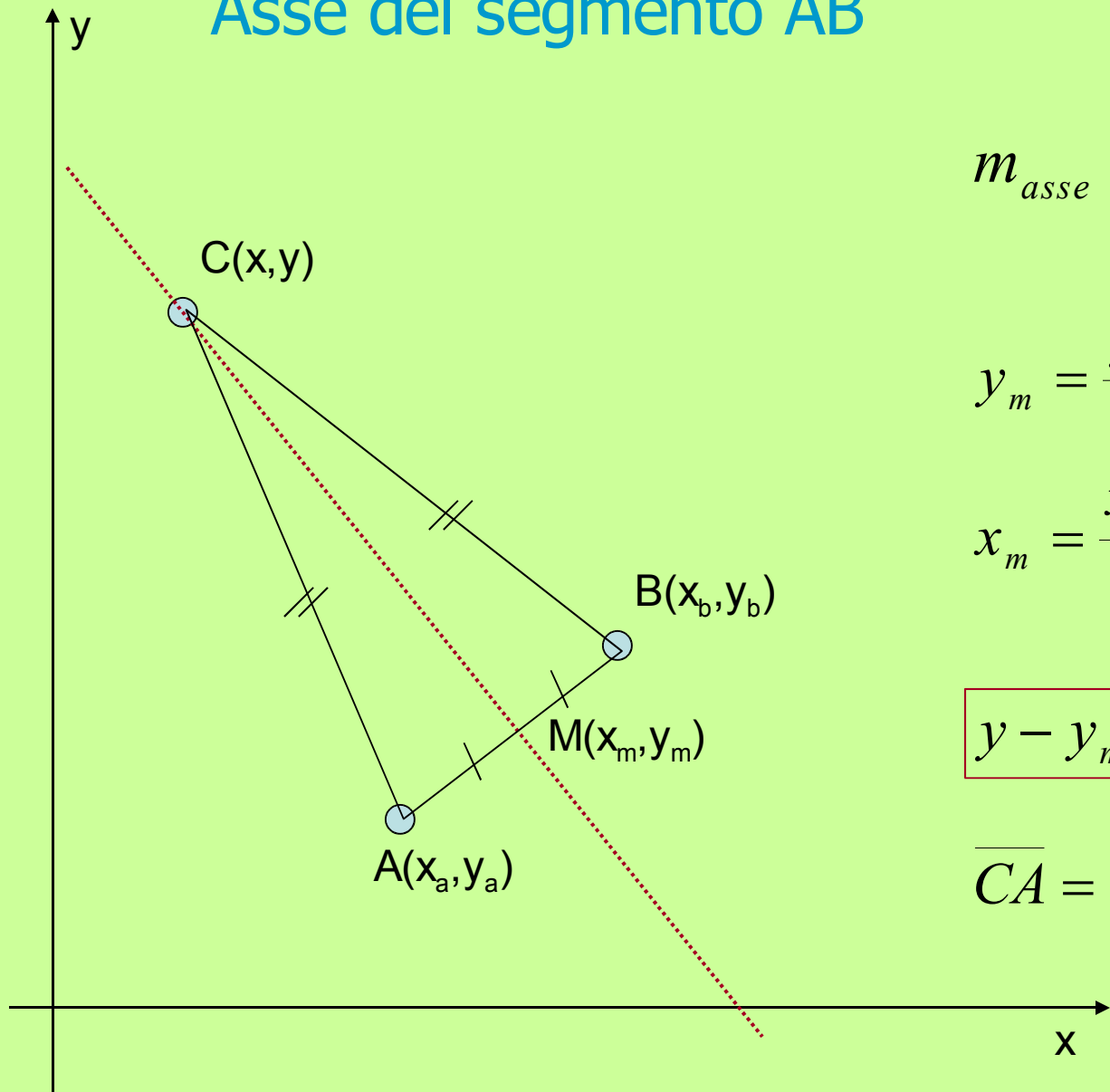
$$m_{asse} = -\frac{1}{m_{AB}}$$

$$y_m = \frac{y_a + y_b}{2}$$

$$x_m = \frac{x_a + x_b}{2}$$

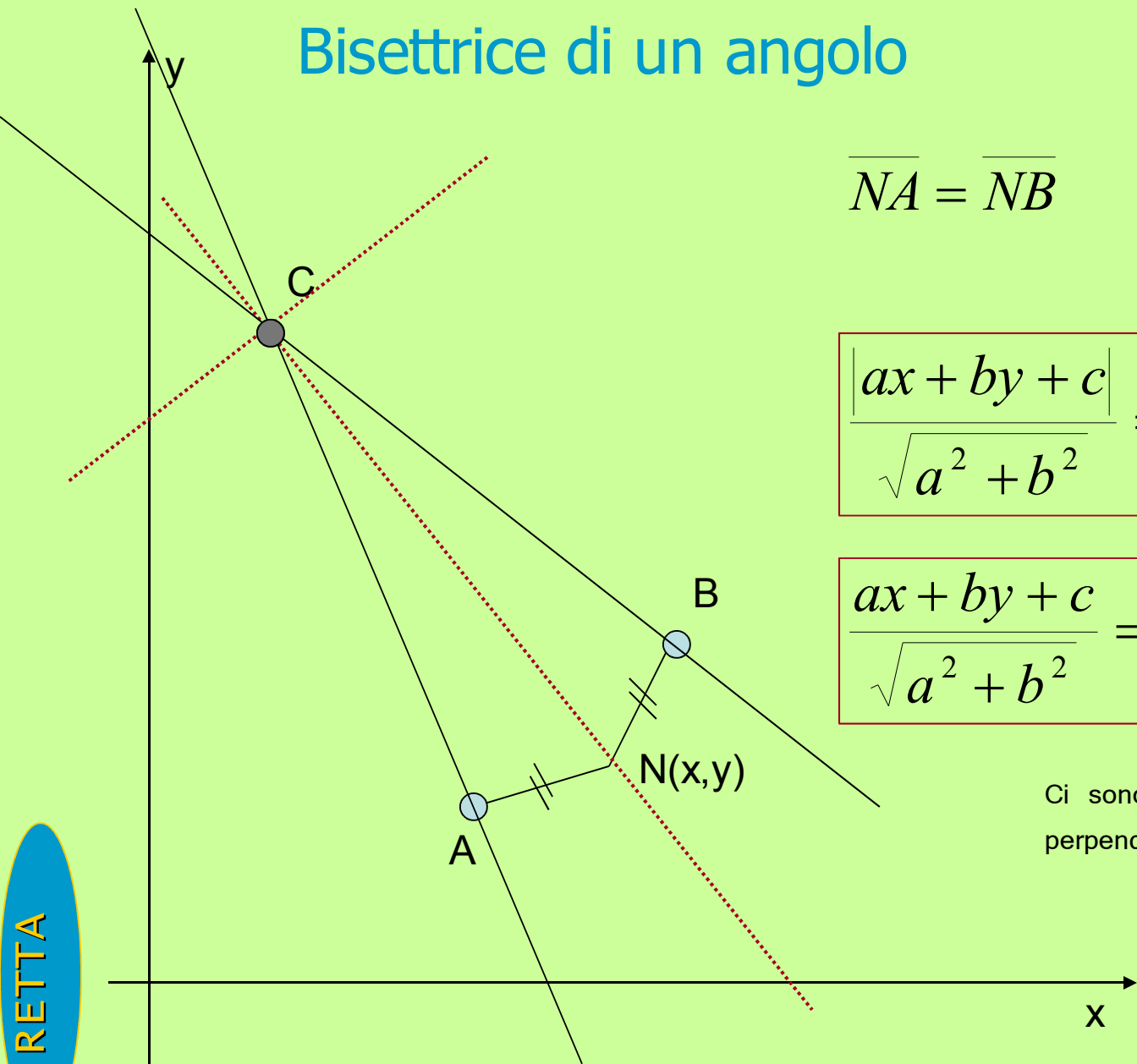
$$y - y_m = m_{asse} (x - x_m)$$

$$\overline{CA} = \overline{CB}$$



RETTA

# Bisettrice di un angolo



$$\overline{NA} = \overline{NB}$$

$$\frac{|ax + by + c|}{\sqrt{a^2 + b^2}} = \frac{|a'x + b'y + c'|}{\sqrt{a'^2 + b'^2}}$$

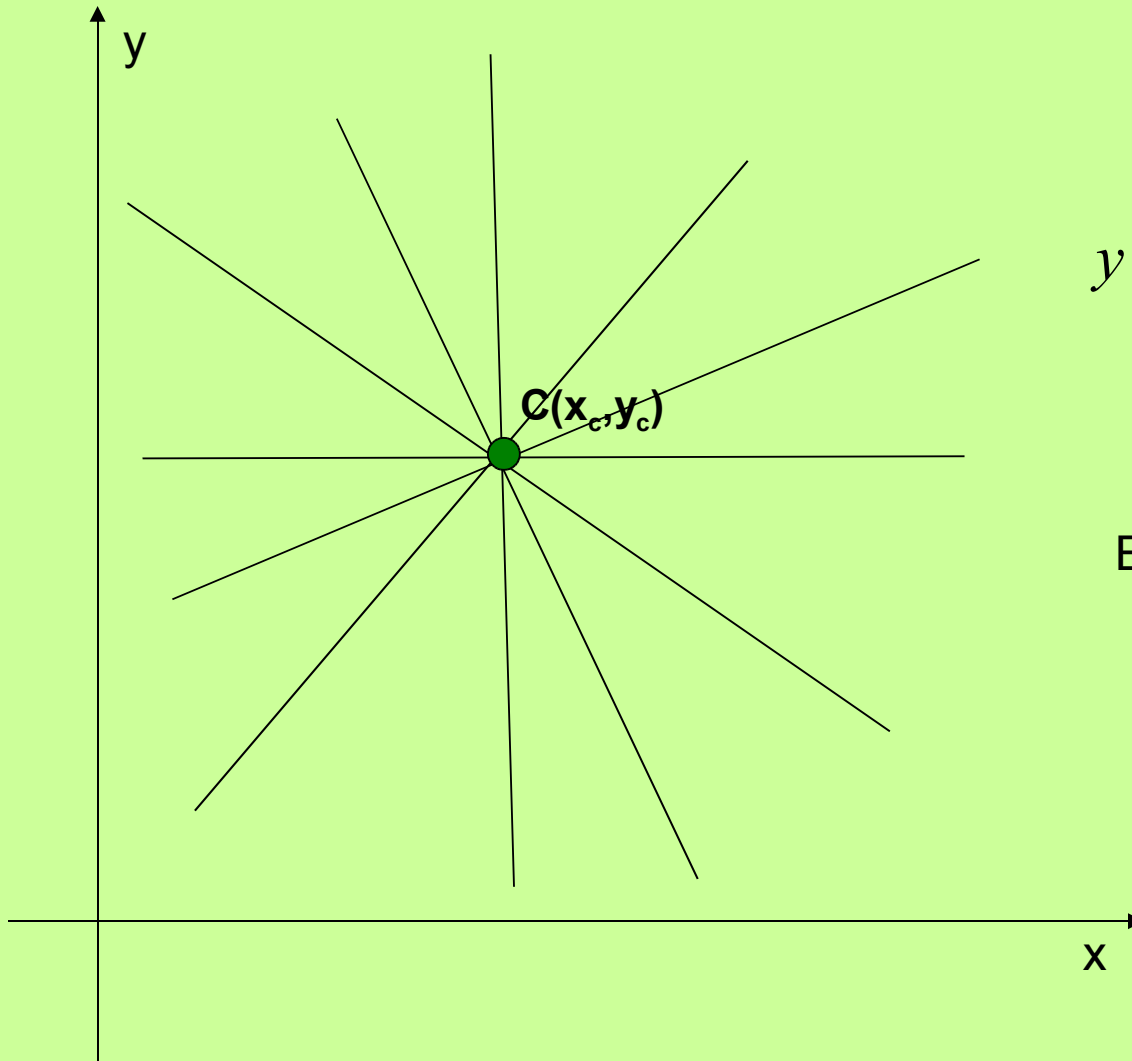
$$\frac{ax + by + c}{\sqrt{a^2 + b^2}} = \pm \frac{a'x + b'y + c'}{\sqrt{a'^2 + b'^2}}$$

Ci sono due bisettrici e sono perpendicolari fra loro!

RETTA

# Fascio proprio di rette di sostegno C

stella di rette che hanno un punto in comune



$$y - y_c = m(x - x_c)$$

Esempio C(2,3)

$$y - 3 = m(x - 2)$$

RETTA

# Fascio improprio di rette

con  $m$  assegnato

insieme infinito di rette parallele fra loro

Esempio:  $m=2$

$$y = 2x + q$$

