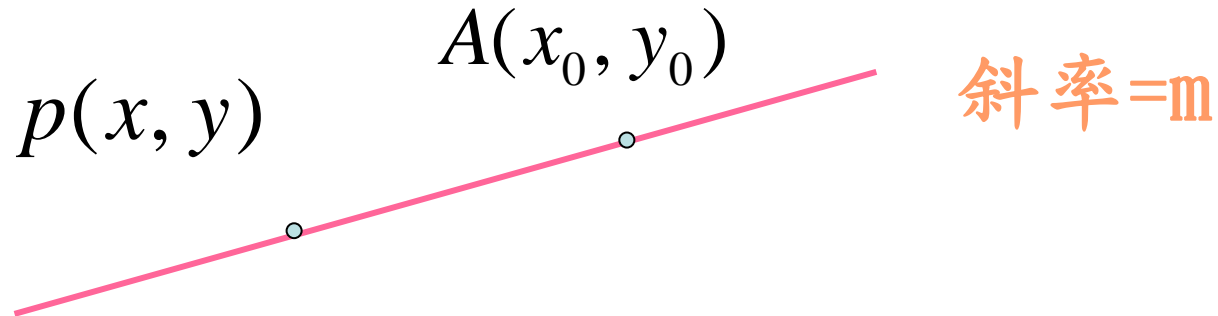


1-2 直線方程式的求法

點斜式



$$m = \frac{y - y_0}{x - x_0}$$

$$y - y_0 = m(x - x_0)$$

稱為直線的點斜式

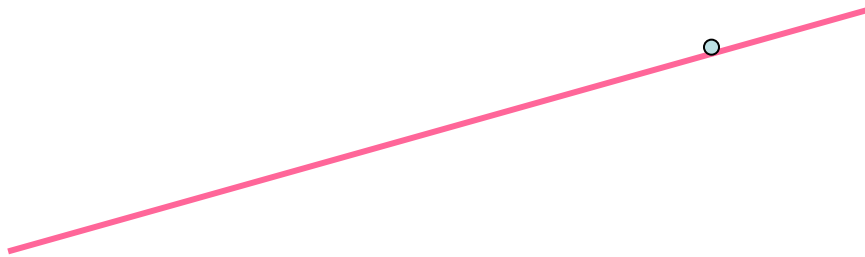
$$y - y_0 = m(x - x_0)$$

例題1

試求過點(-2,3)且斜率為1/2的直線方程式

(-2,3)

$$m = \frac{1}{2}$$



直線之點斜式為

$$y - 3 = \frac{1}{2}(x + 2)$$

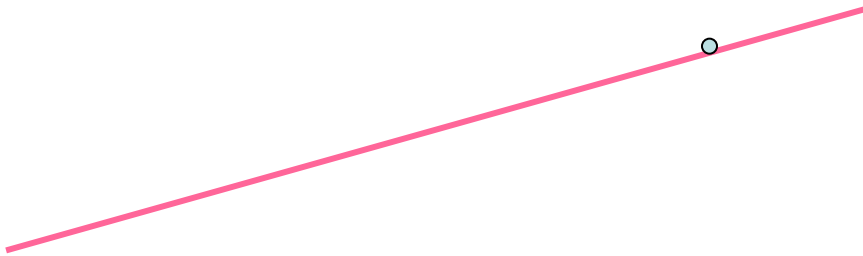
練習1

$$y - y_0 = m(x - x_0)$$

試求過點(3,2)且斜率為1/2的直線方程式

(3,2)

$$m = \frac{1}{2}$$



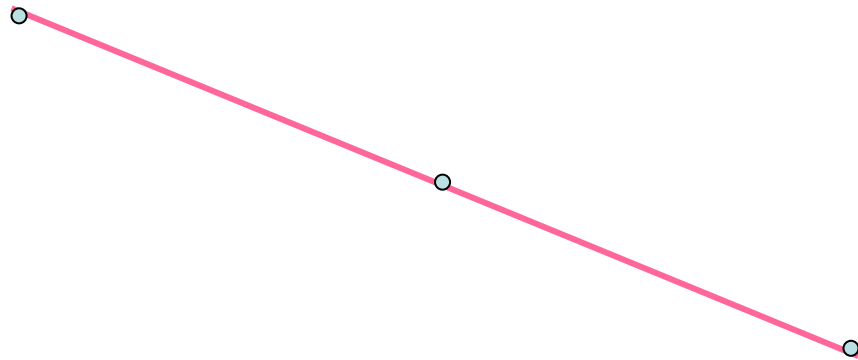
直線之點斜式為

$$y - 2 = \frac{1}{2}(x - 3)$$

中點公式

$Q(x_2, y_2)$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$



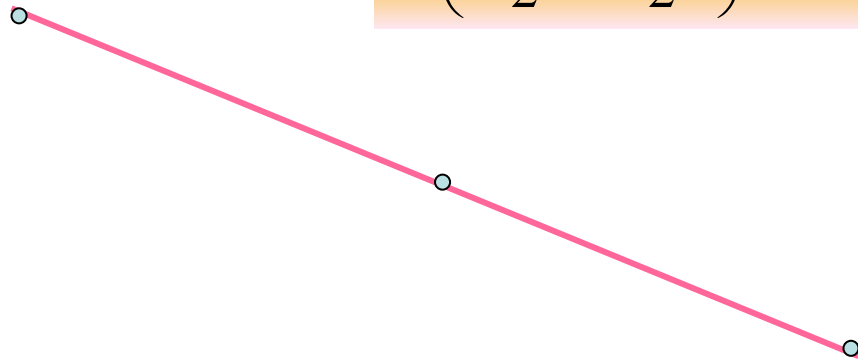
$P(x_1, y_1)$

中點公式練習

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

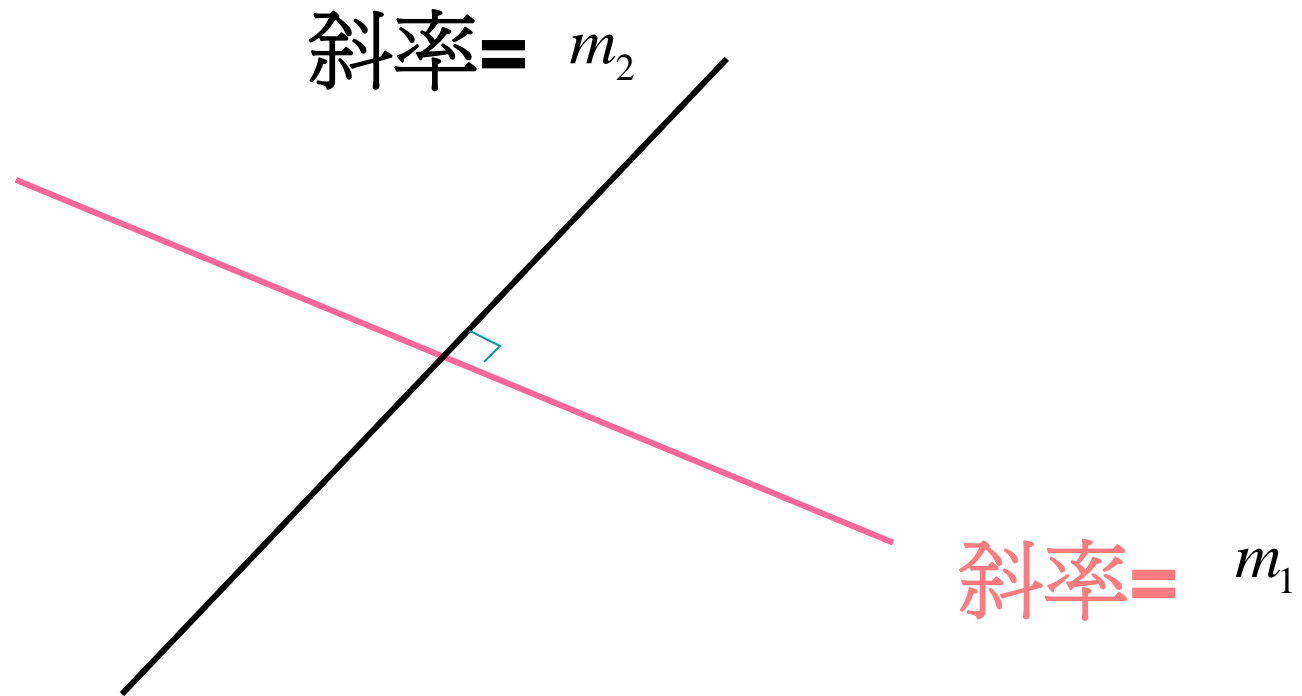
$Q(2,5)$

$$M\left(\frac{2+4}{2}, \frac{5-3}{2}\right) = (3,1)$$



$P(4,-3)$

複習

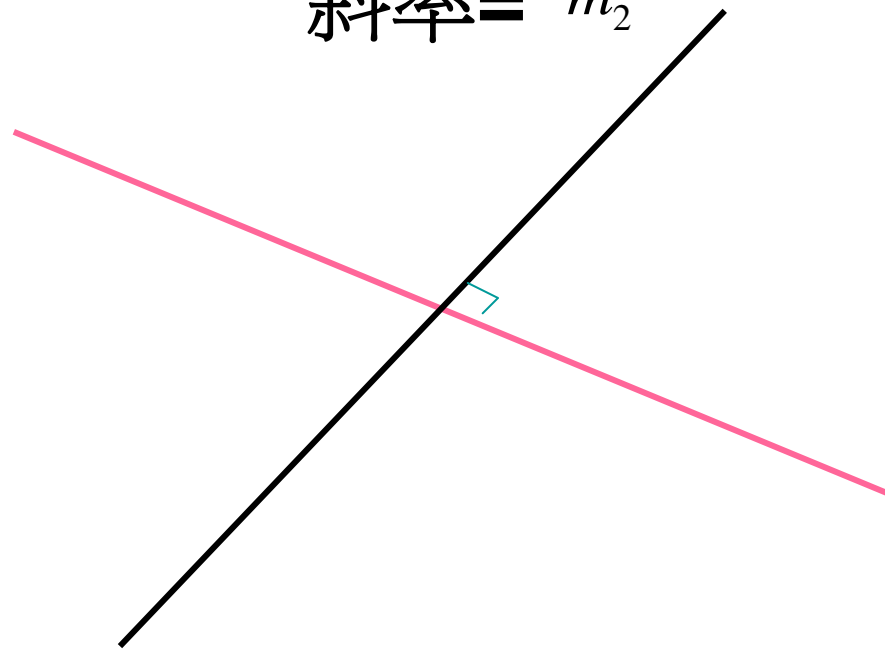


$$m_1 \times m_2 = -1$$

$$m_1 \times m_2 = -1$$

練習

斜率 = m_2



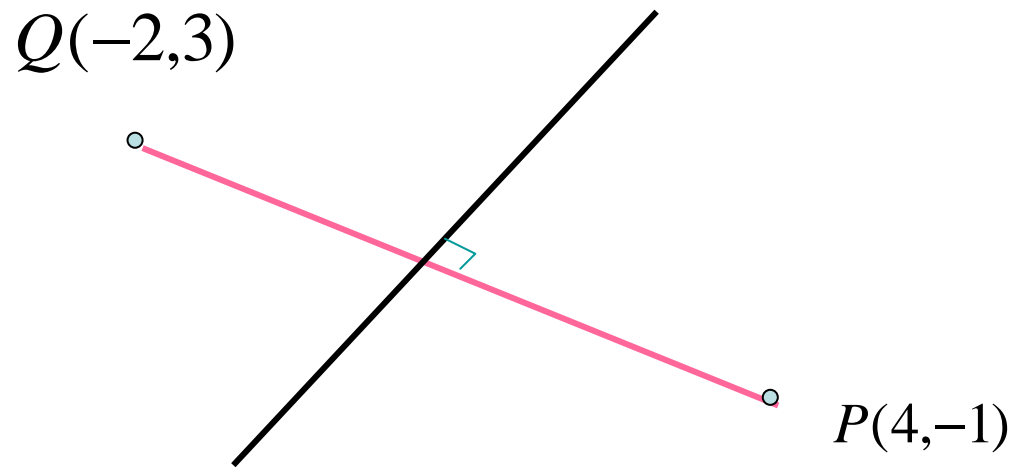
斜率 = $\frac{2}{5}$

$$m_2 = \underline{\underline{-\frac{5}{2}}}$$

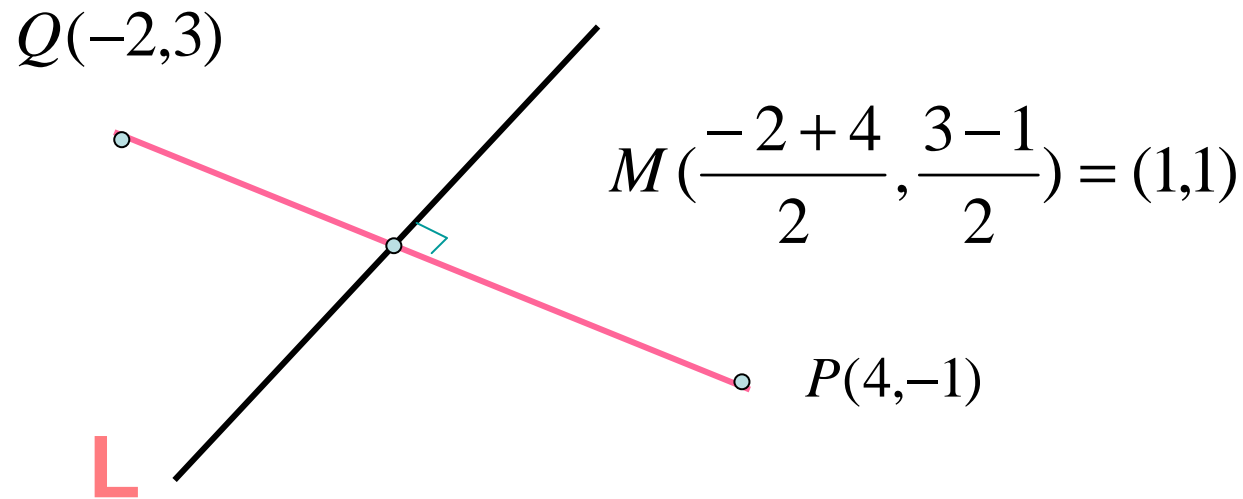
例題2

若 $p(4,-1), Q(-2,3)$ 為平面上兩點，試求

\overline{PQ} 的垂直平分線方程式



例題2解答



$$\overline{PQ} \text{ 的斜率} = \frac{-1-3}{4-(-2)} = \frac{-4}{6} = -\frac{2}{3}$$

$$L \text{ 的斜率} = \frac{3}{2}$$

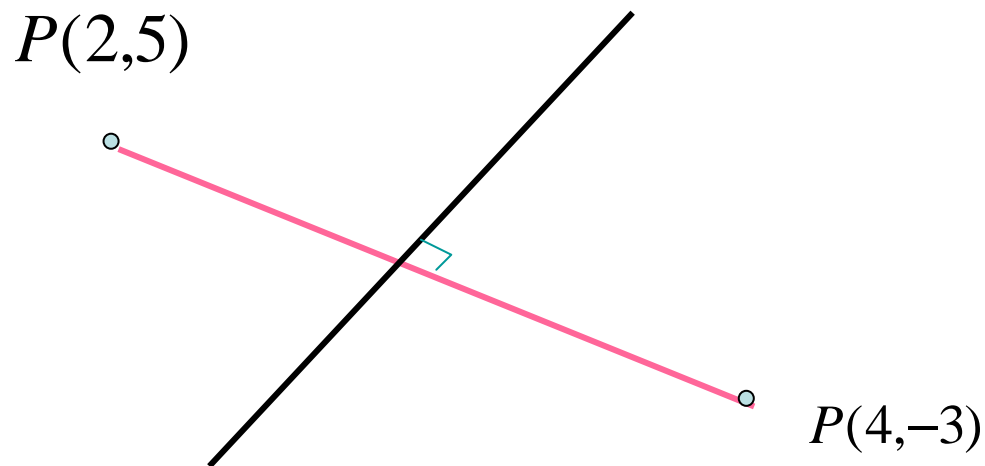
$$L \text{ 的點斜式} = y - 1 = \frac{3}{2}(x - 1)$$

習題1-2 第3題

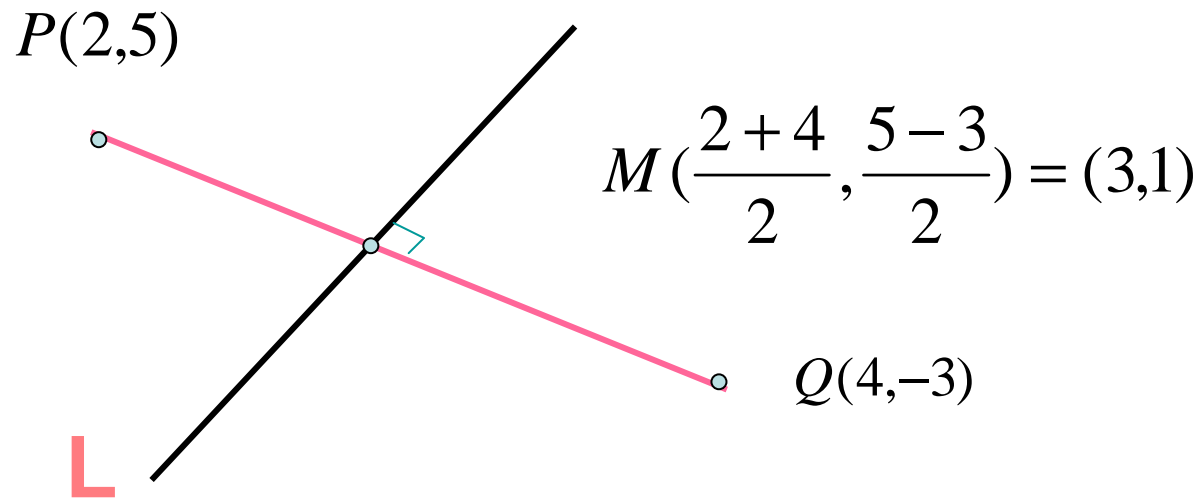
$$y - 3 = \frac{1}{2}(x + 2)$$

若 $p(2,5), Q(4,-3)$ 為平面上兩點，試求

\overline{PQ} 的垂直平分線方程式



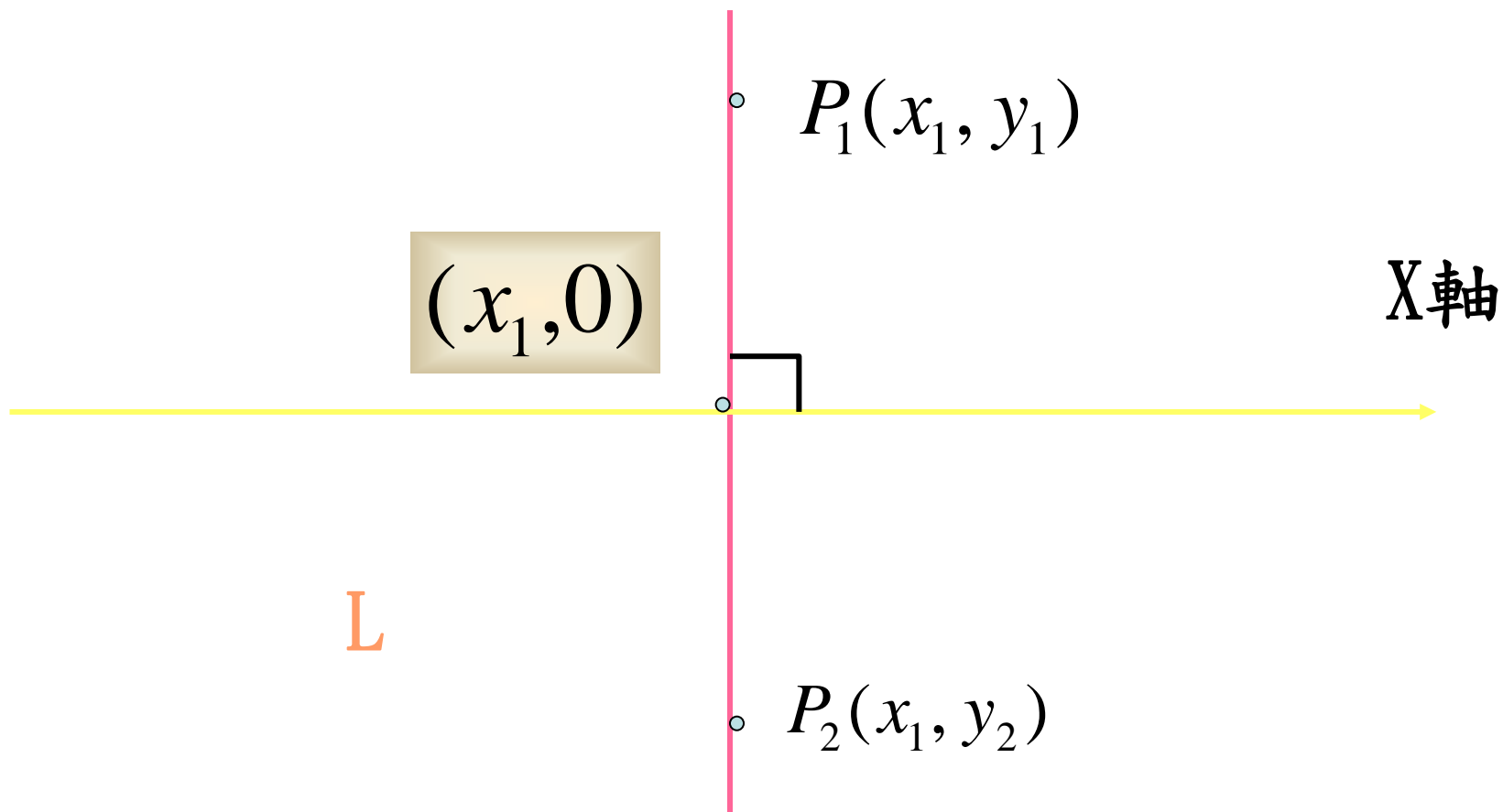
習題1-2 第3題解答



$$\overline{PQ} \text{ 的斜率} = \frac{-3-5}{4-2} = \frac{-8}{2} = -4$$

$$L \text{ 的斜率} = \frac{1}{4}$$

$$L \text{ 的點斜式} = y - 1 = \frac{1}{4}(x - 3)$$

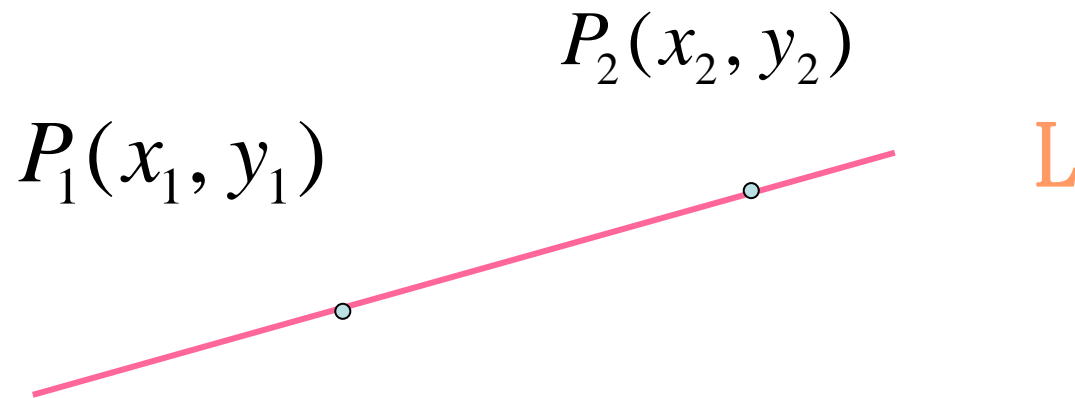


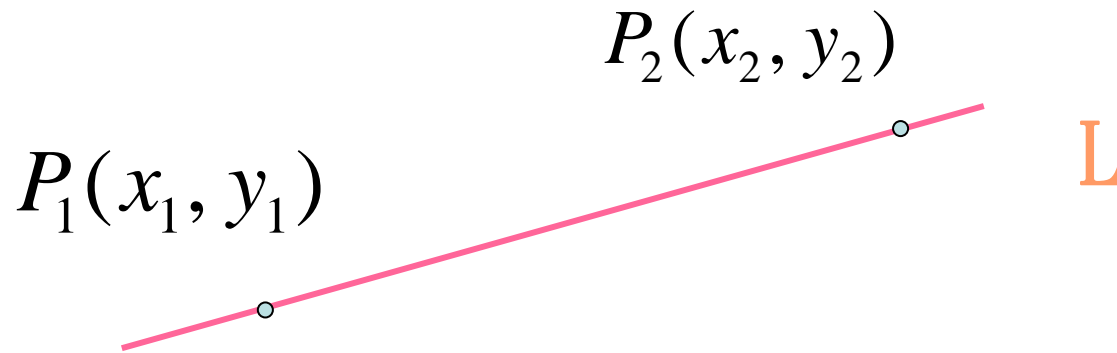
所以直線L方程式為

$$x = x_1$$

兩點式

平面上相異兩點決定唯一一條直線





若 $x_1 \neq x_2$ 則此直線必不垂直於X軸，斜率為

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

所以直線L方程式（點斜式）為

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

整理得

$$(x_2 - x_1)(y - y_1) = (y_2 - y_1)(x - x_1)$$

稱為直線L的
兩點式

$$(x_2 - x_1)(y - y_1) = (y_2 - y_1)(x - x_1)$$

$B(-2,3)$



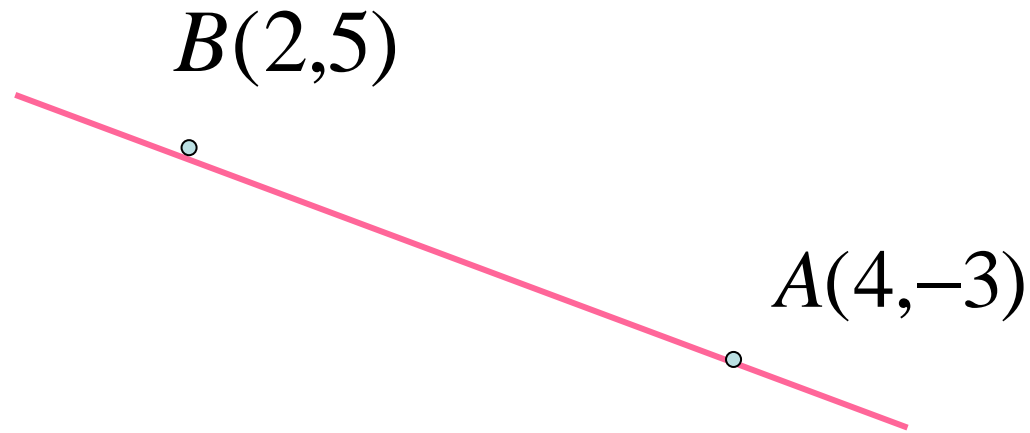
所以直線L方程式為

$$(-2 - 5)(y + 3) = (3 - (-3))(x - 5)$$

$$-7(y + 3) = 6(x - 5)$$

$$6x + 7y - 9 = 0$$

$$(x_2 - x_1)(y - y_1) = (y_2 - y_1)(x - x_1)$$



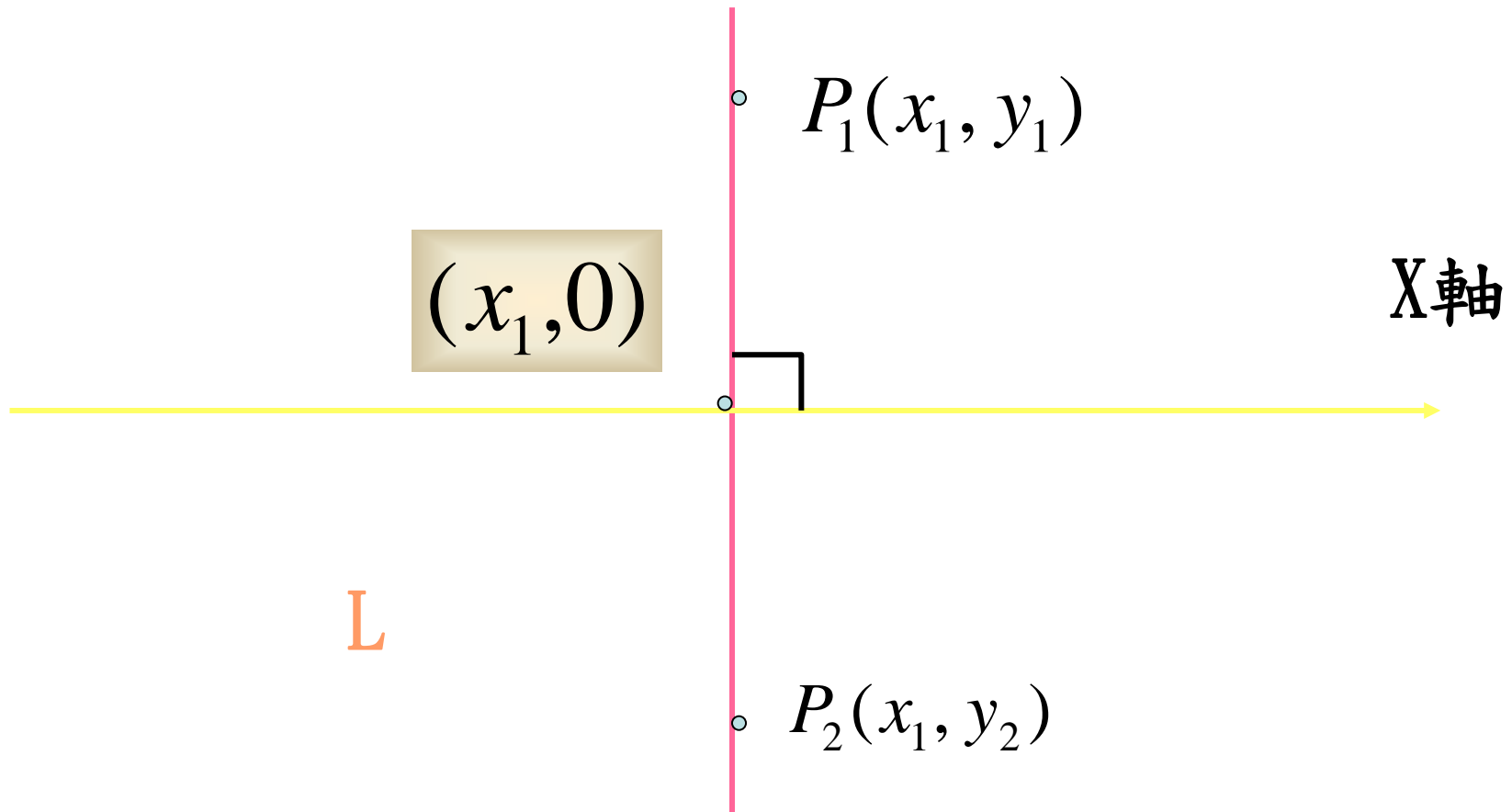
所以直線L方程式為

$$(2 - 4)(y + 3) = (5 - (-3))(x - 4)$$

$$-2(y + 3) = 8(x - 4)$$

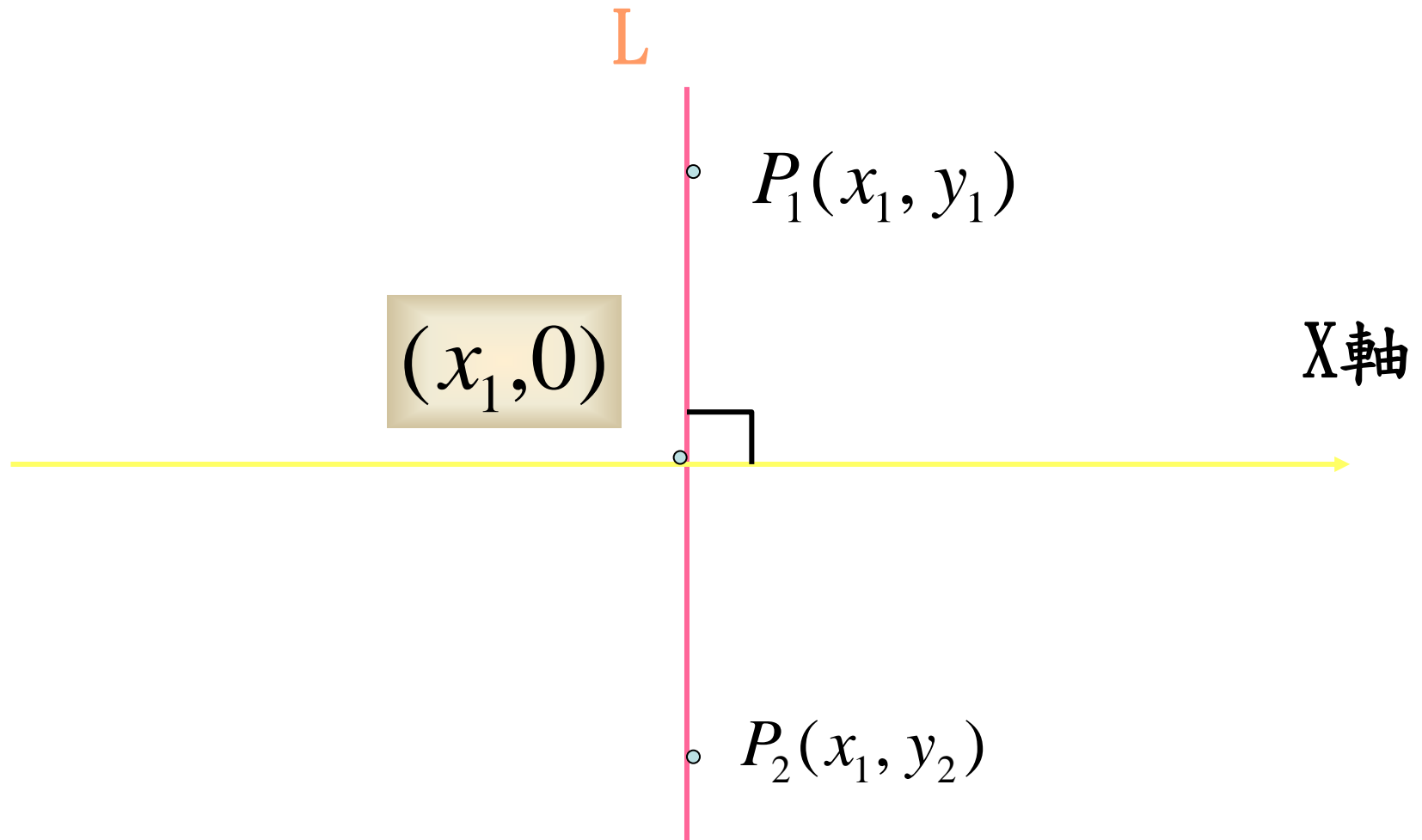
$$8x + 2y - 26 = 0$$

若 $x_1 = x_2$ 則此直線垂直於X軸，斜率不存在



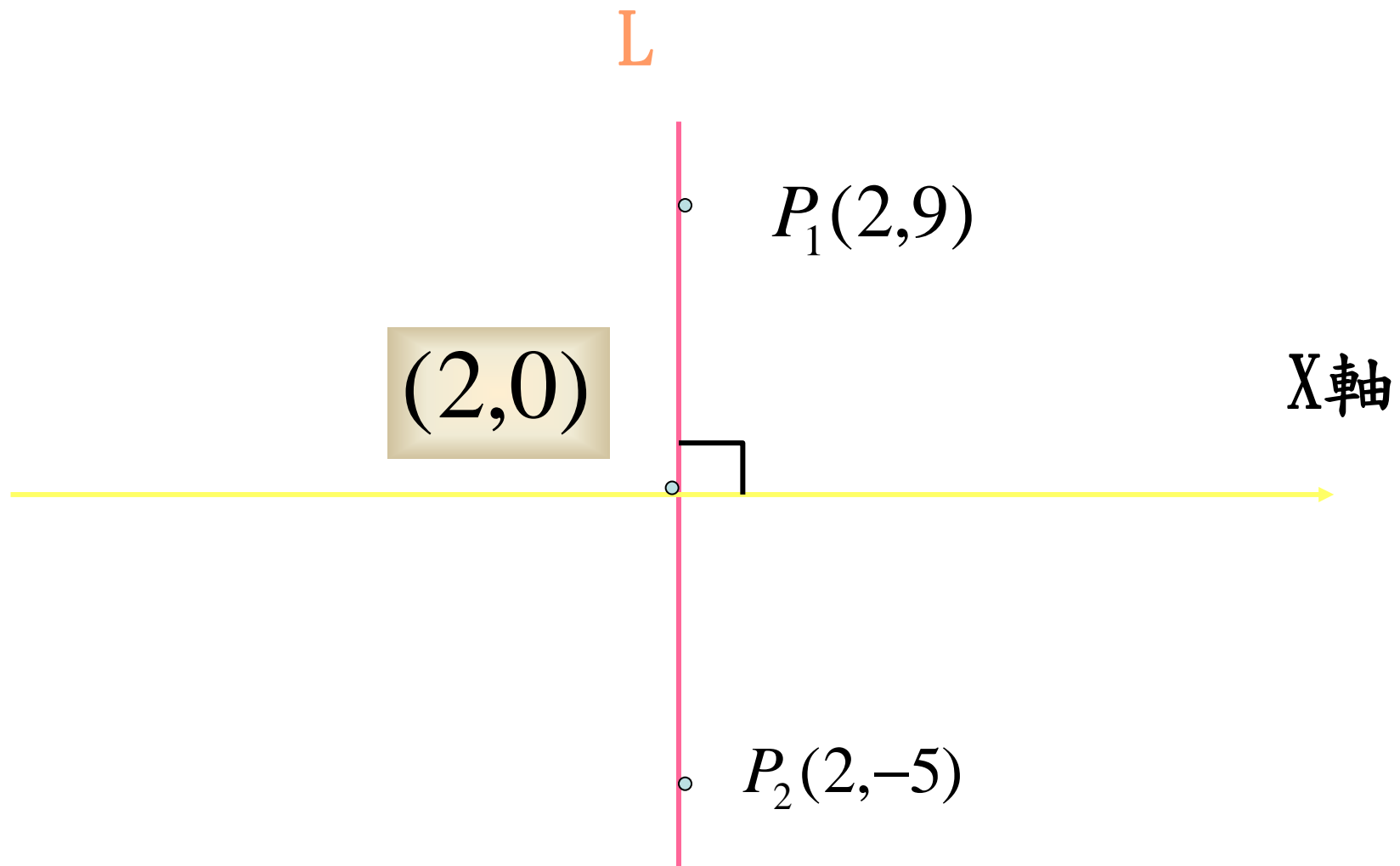
所以直線L方程式為

$$x = x_1$$



所以直線L方程式為

$$x = x_1$$



所以直線L方程式為

$$x = 2$$

斜截式

Y軸

$P_2(0, b)$

b

L的y截距

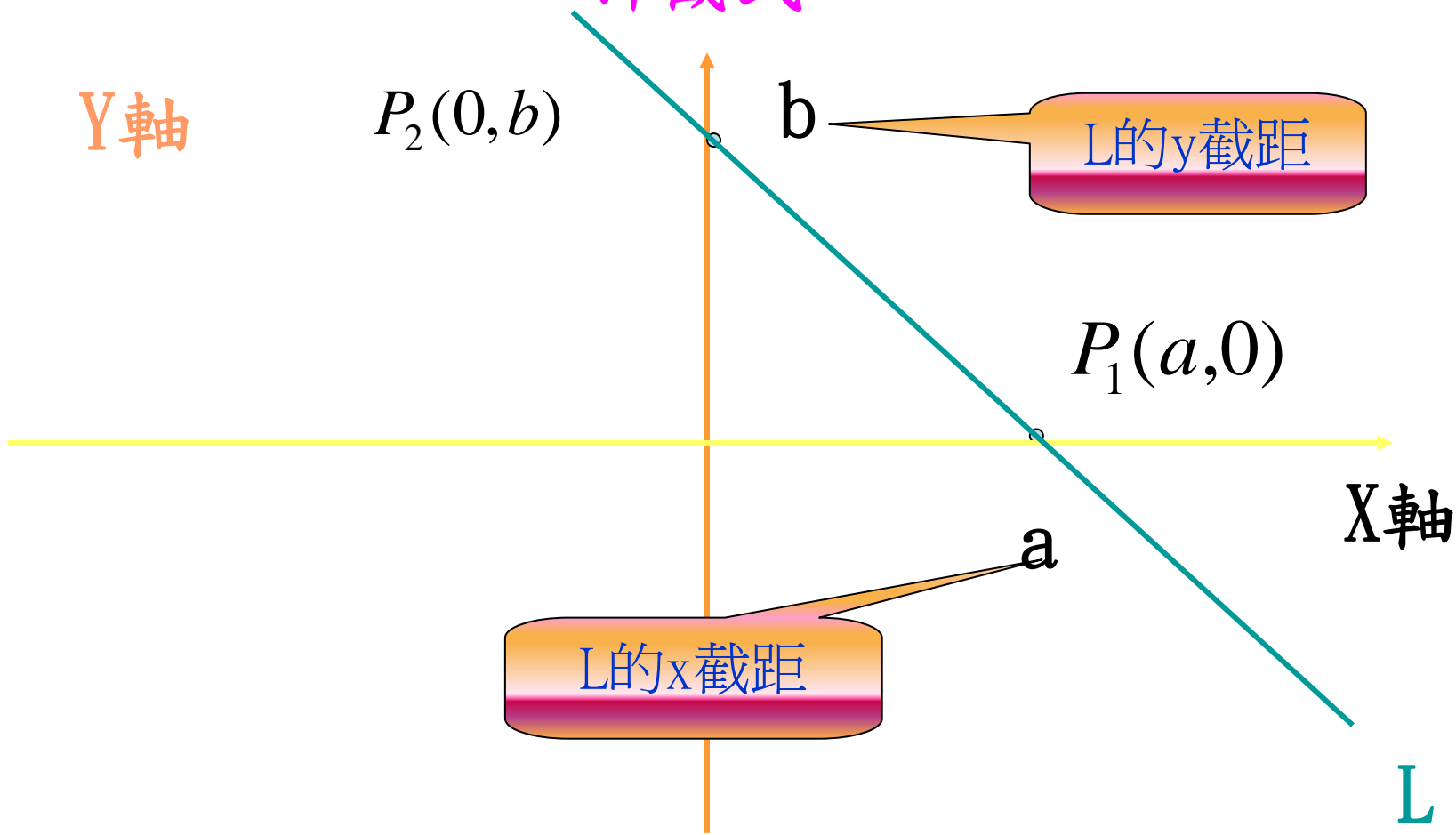
$P_1(a, 0)$

a

L的x截距

X軸

L



Y軸

斜率為m

$P_1(a,0)$

X軸

L的斜截式

a

L的x截距

L

所以直線L的點斜式為

$$y - 0 = m(x - a)$$

$$\hat{y} = mx - ma$$

Y軸

斜率為 m

$P_1(a,0)$

X軸

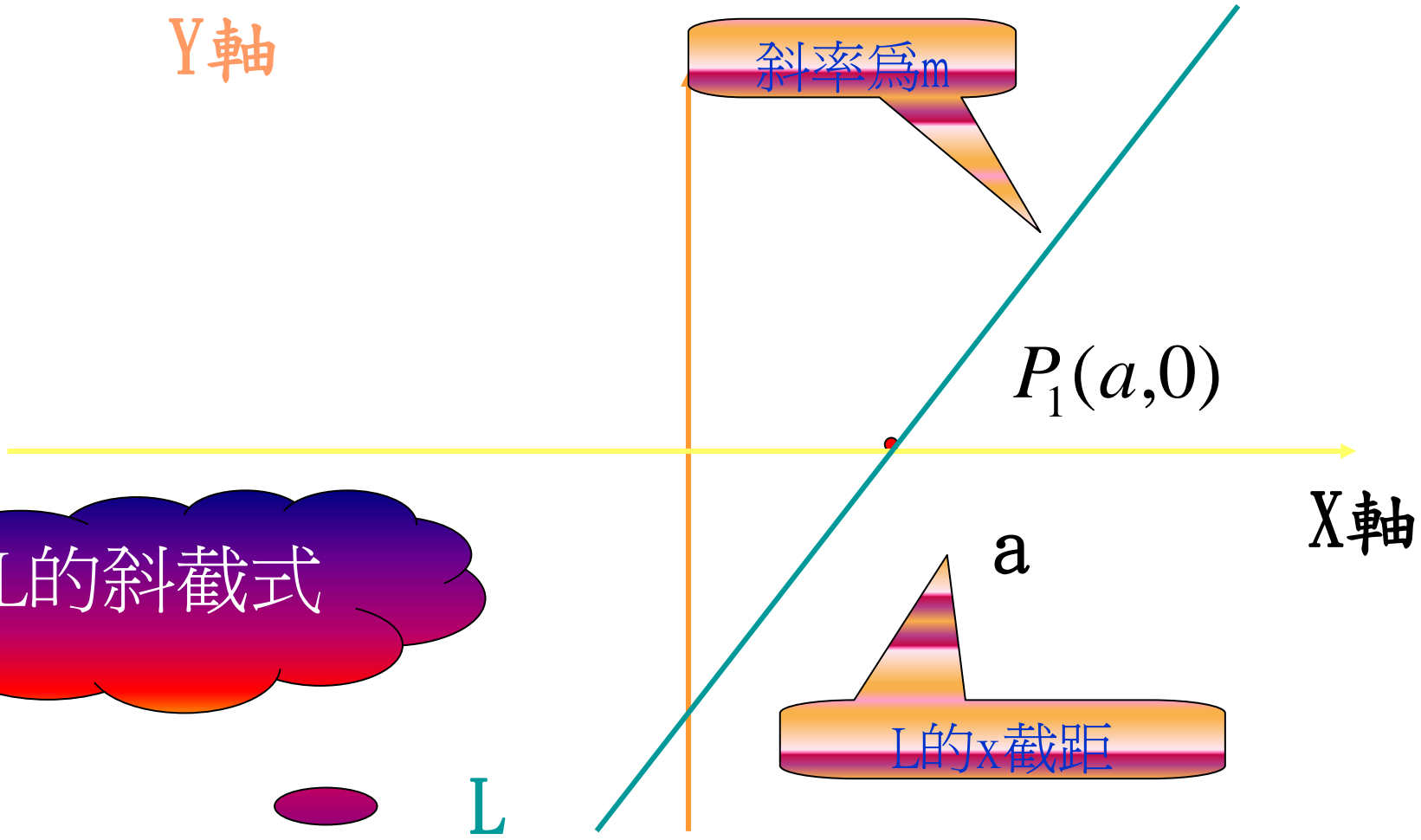
L的斜截式

a

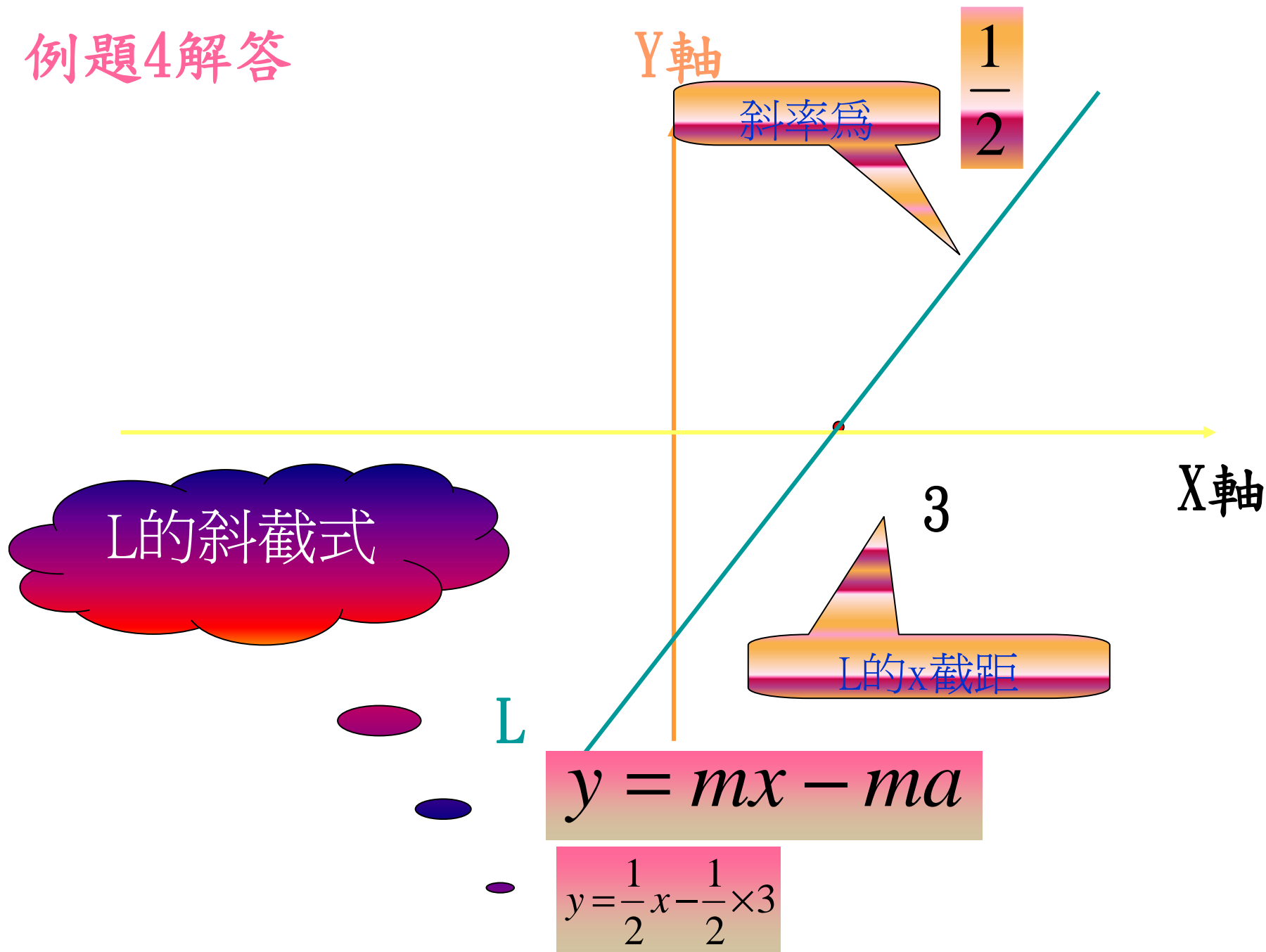
L的x截距

L

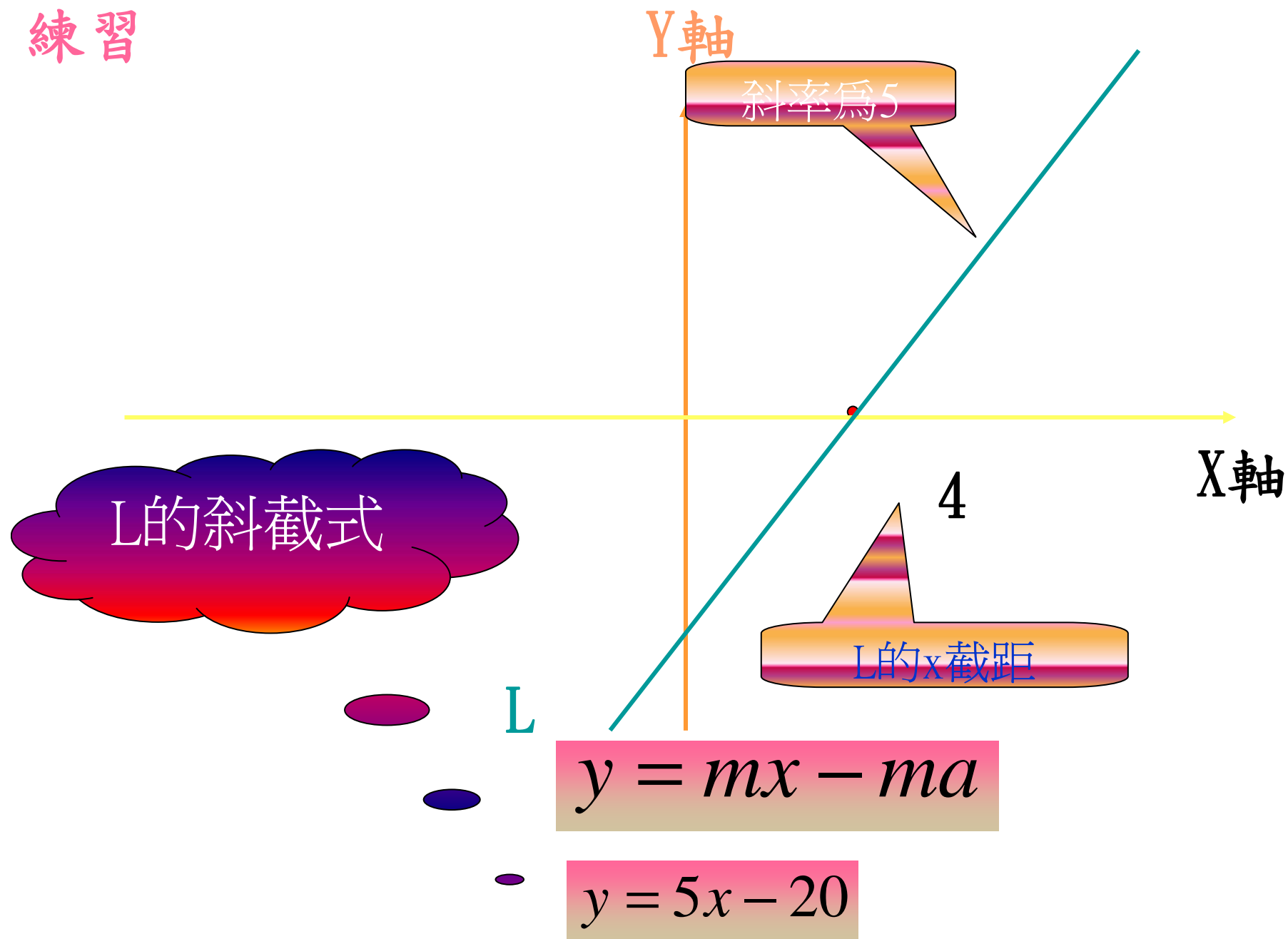
$$y = mx - ma$$

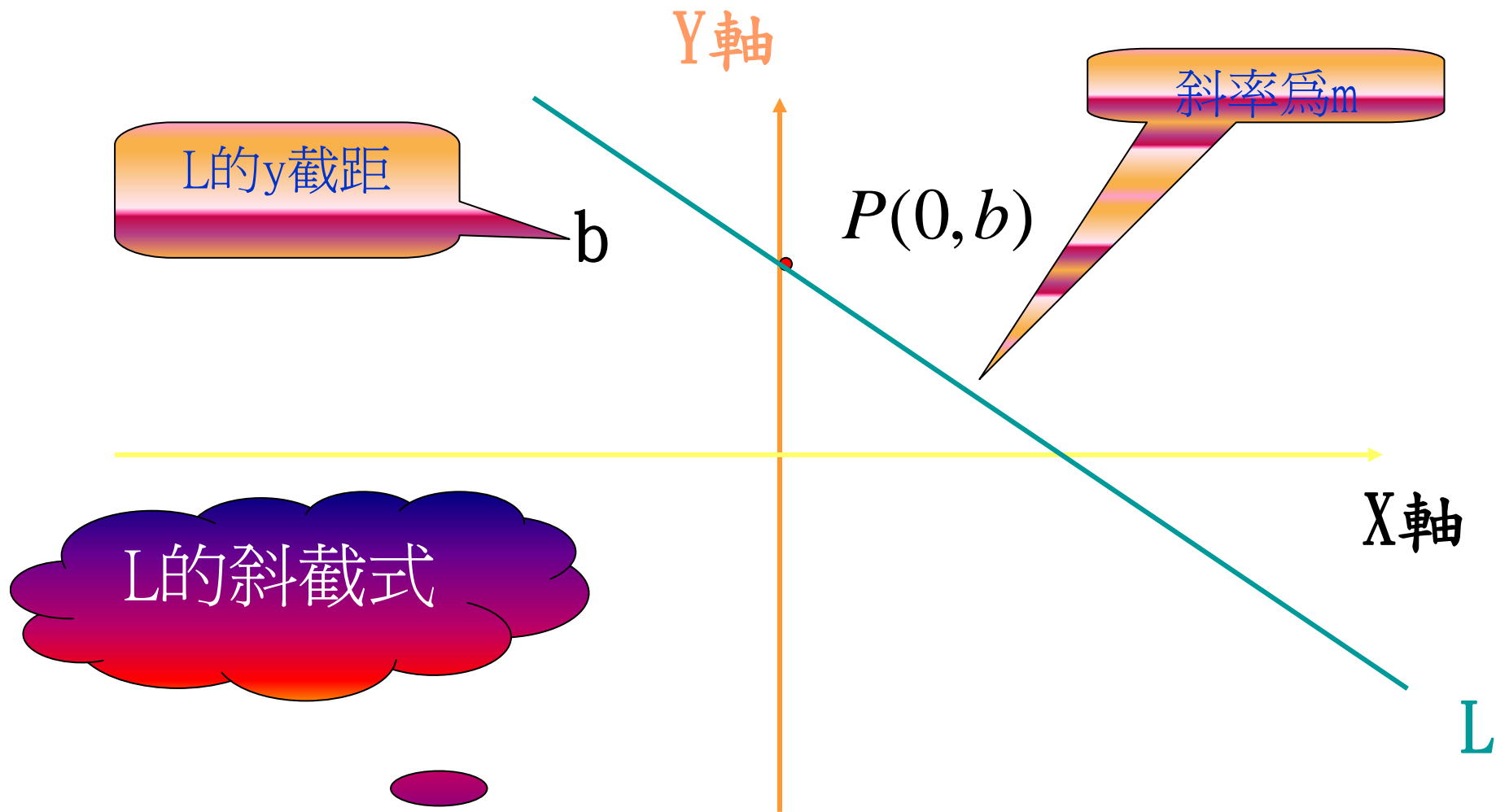


例題4解答



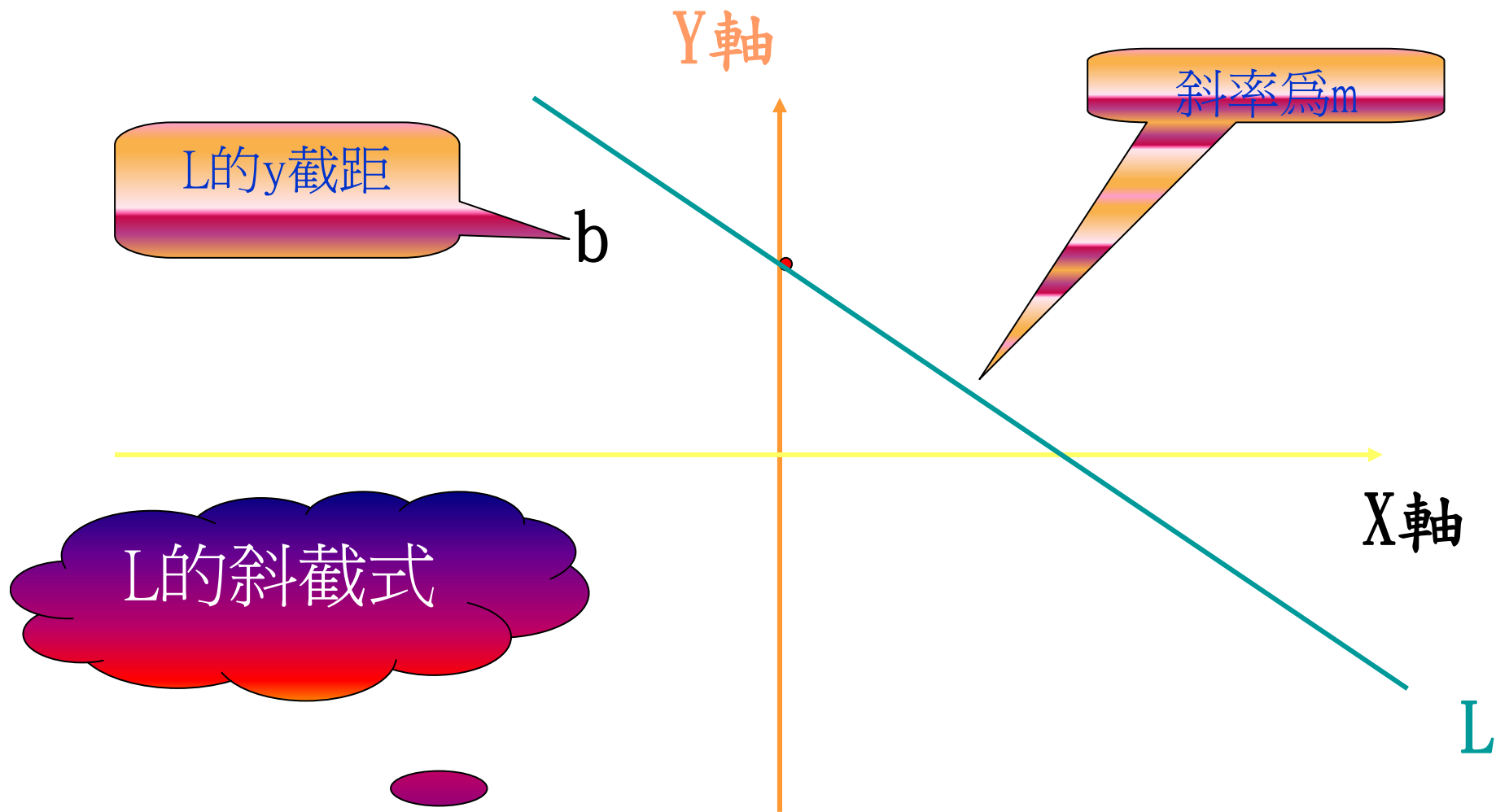
練習



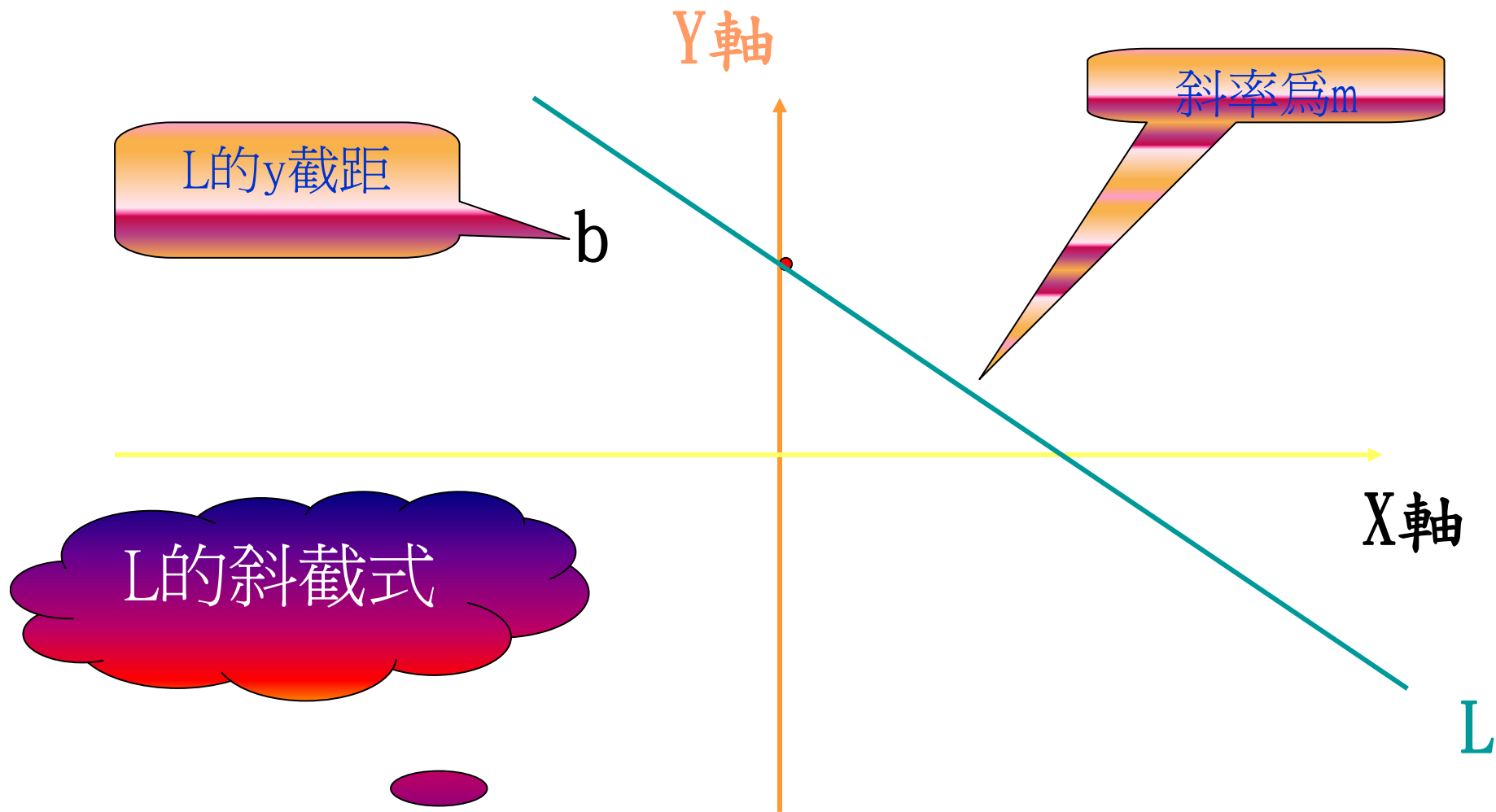


所以直線L的點斜式為 $y - b = m(x - 0)$

$$y = mx + b$$



$$y = mx + b$$



$$y = mx + b$$

例題5解答

Y軸

斜率為-2

L

X軸

L的斜截式

L的y截距

-2

$$y = mx + b$$

$$y = -2x - 2$$

隨堂練習

L

斜率為-2

Y軸

3

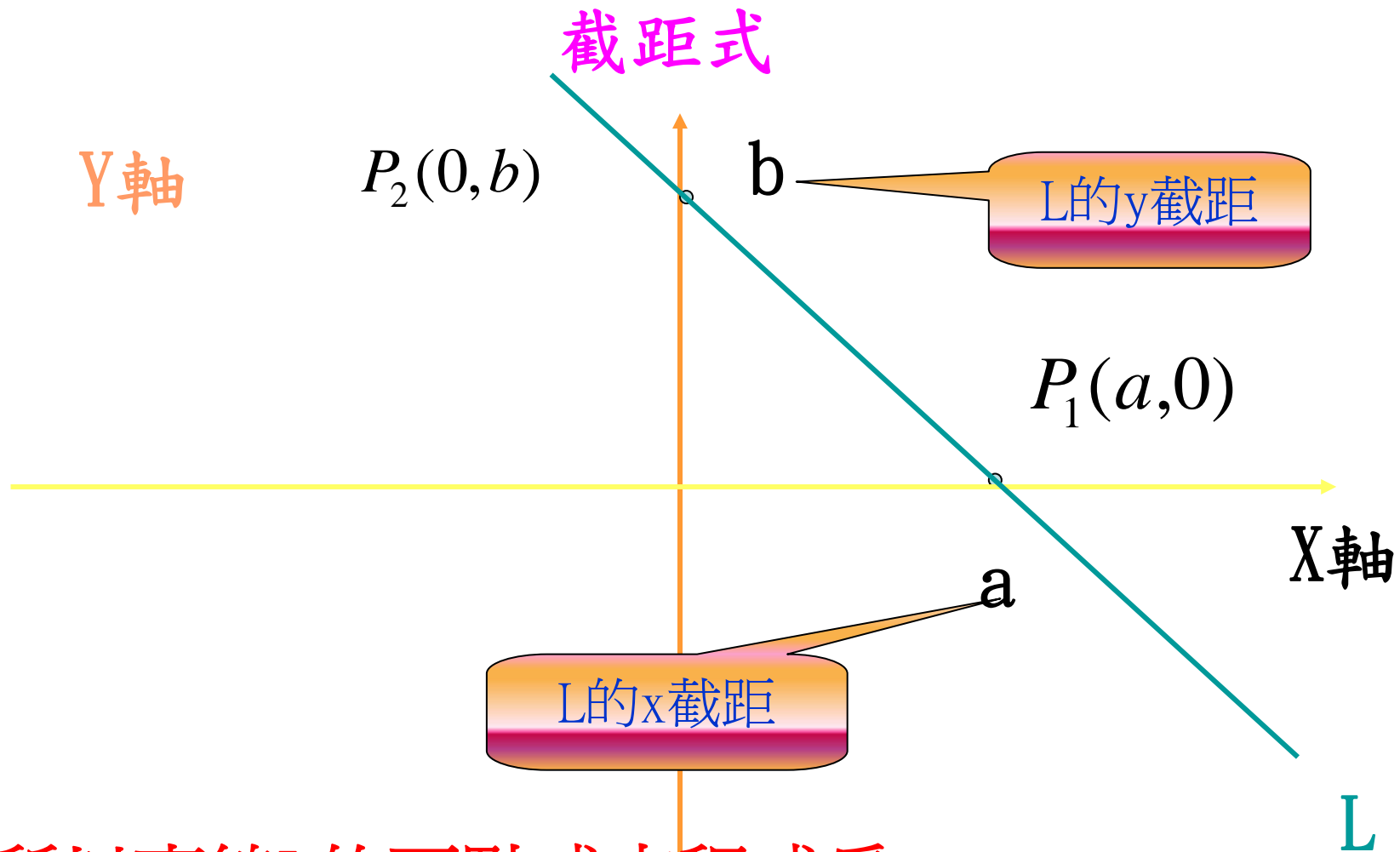
L的y截距

X軸

L的斜截式

$$y = mx + b$$

$$y = -2x + 3$$



所以直線L的兩點式方程式為

$$\frac{(0 - a)y}{bx + a} = \frac{(x - a)(0 - b)}{a - b}$$

L的截距式

截距式

Y軸

b

L的y截距

X軸

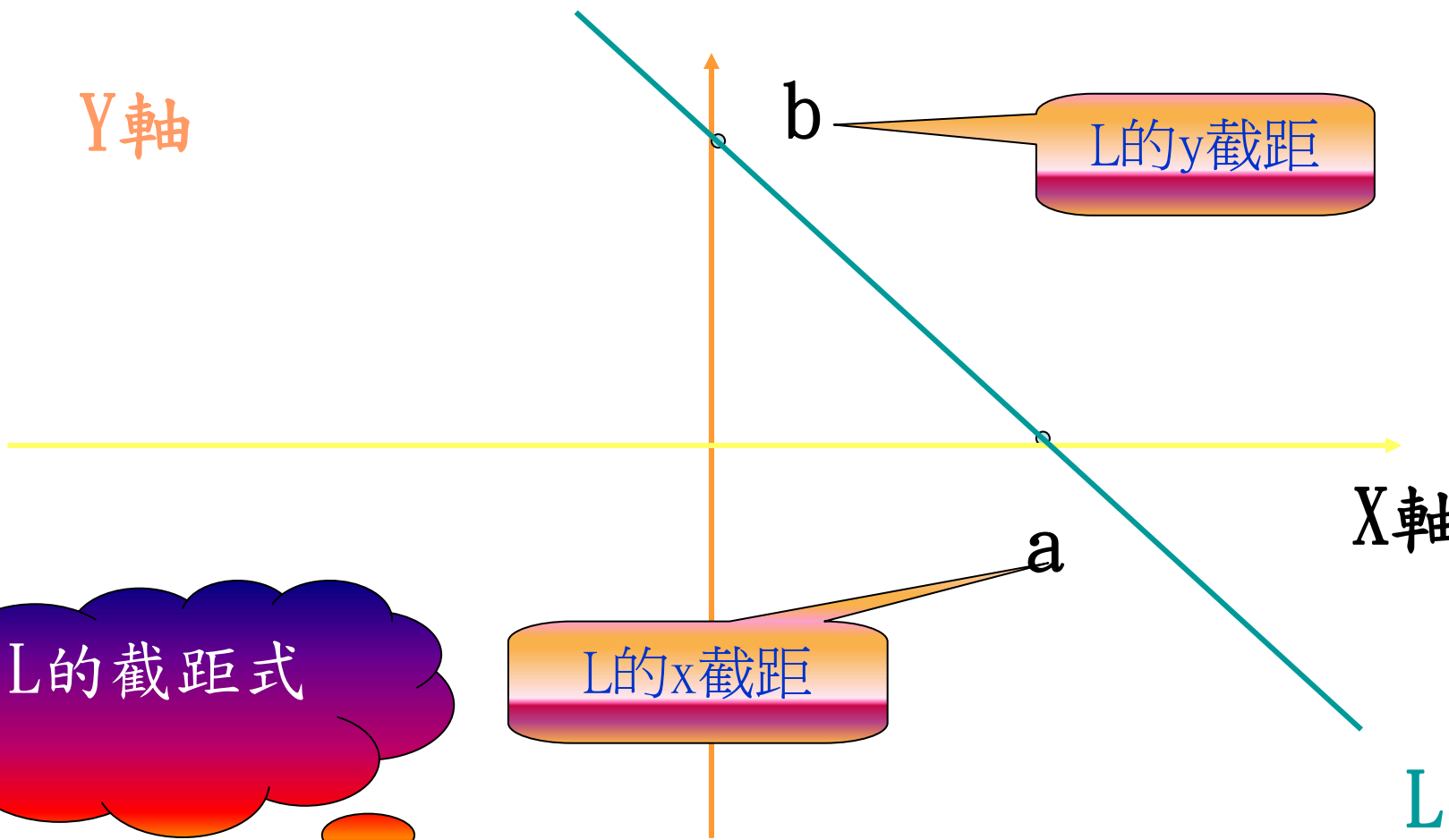
a

L的x截距

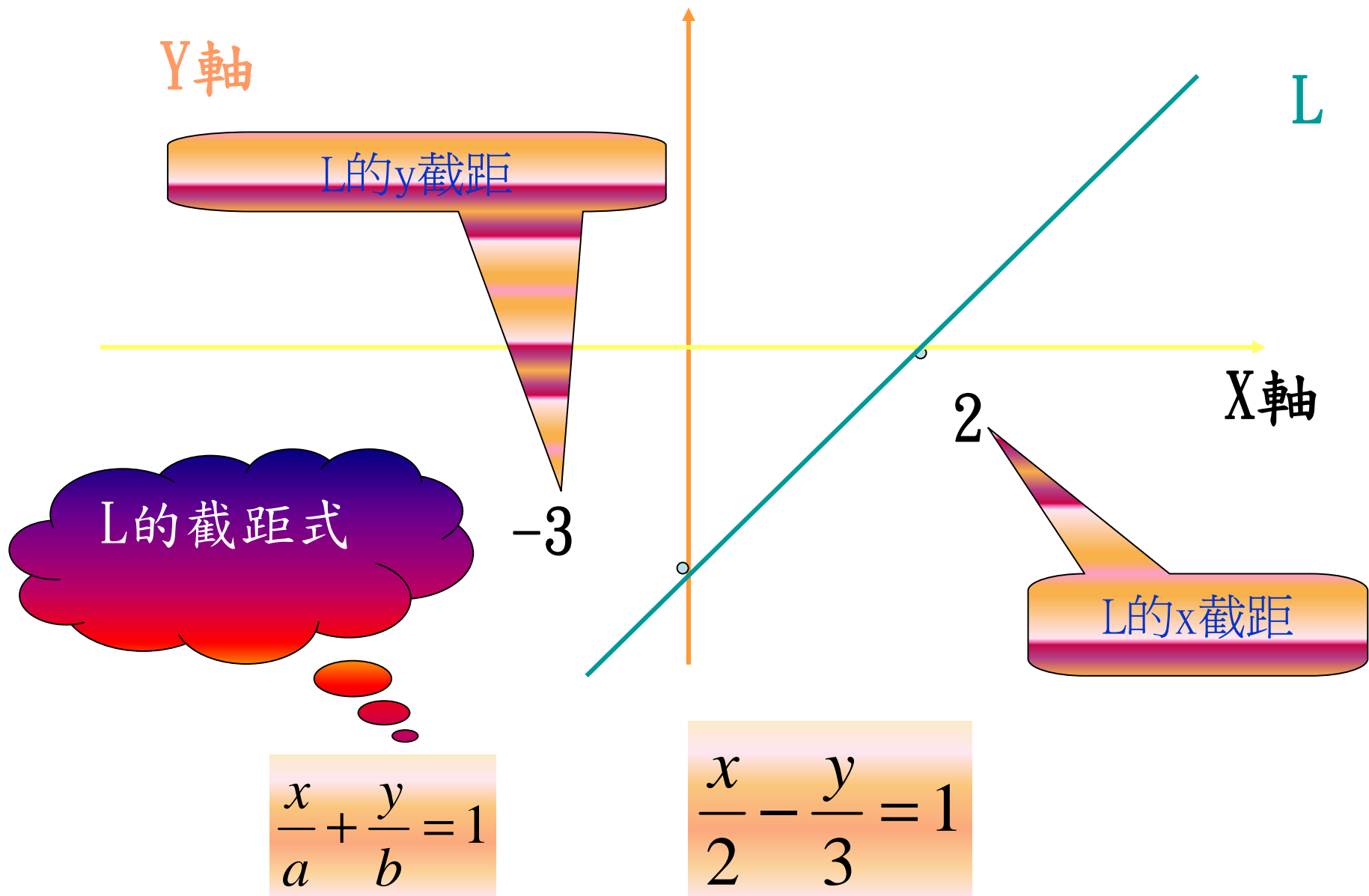
L

L的截距式

$$\frac{x}{a} + \frac{y}{b} = 1$$



例題6



隨堂練習

Y軸

L

L的y截距

3

-2

L的x截距

X軸

L的截距式

$$\frac{x}{a} + \frac{y}{b} = 1$$

$$-\frac{x}{2} + \frac{y}{3} = 1$$

