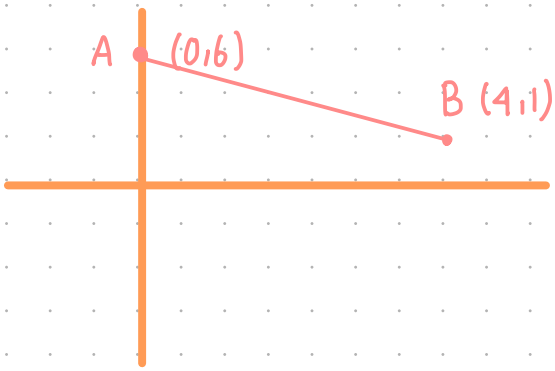
COORDINATE GEOMETRY

1. Length Of Line Segment



Length of AB?

$= \sqrt{(0-4)^2 + (6-1)^2}$

$= \sqrt{16 + 25}$

$= \sqrt{41}$

2. Formula

1 / Gradien

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

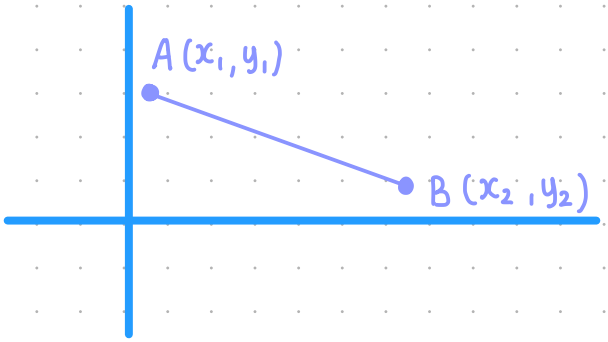
2 / Mid Point

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

3/ Length Of AB

$$AB = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

3. Equation



Ex :

- Diketahui 2 titik

  A = (2, 3)

  B = (4, 1)

Find the gradient n the equation!

1/ Search The Gradient

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

$$= \frac{1 - 3}{4 - 2}$$

$$= -1$$

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

$$\frac{y - 3}{1 - 3} = \frac{x - 2}{4 - 2}$$

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

$$y = -x + 5$$

Ex :

Given 1 point (3,5) , m = 2

① Cara Biasa

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

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

$y = 2x - 1$

② Cara Cepet dar

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

2/ $2x - y = 2.(3) - 5$

$2x - y = 1$

Ex :

$m = -\frac{2}{5}$ (2 → taro di x, 5 → taro di y) , (7,4)

Cara dar

$2x + 5y = 2(7) + 5(4)$

$= 34$

$5y = -2x + 34$

Ex :

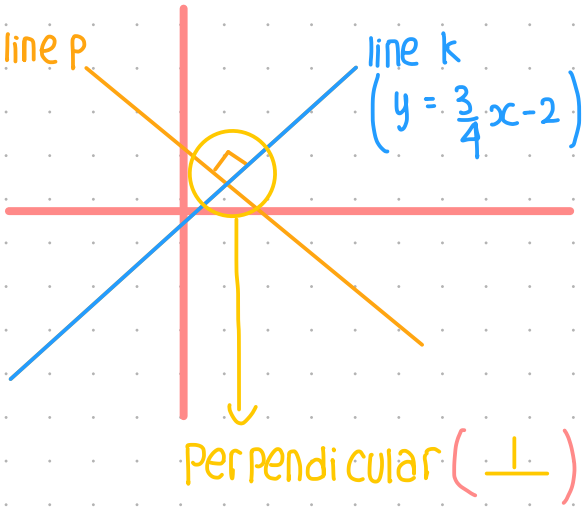
$2x + 5y = C \quad (4,7)$

$2x + 5y = 2(4) + 5(7)$

$= 43$

4. Sifat - Sifat Gradien

a) Perpendicular (tegak lurus) ⊥



gradient

line P ⊥ line k , m_P ?

Use $m_k \cdot m_P = -1$

Example!

$y = \frac{3}{4}x - 2$ (line k)

$y = mx + c$

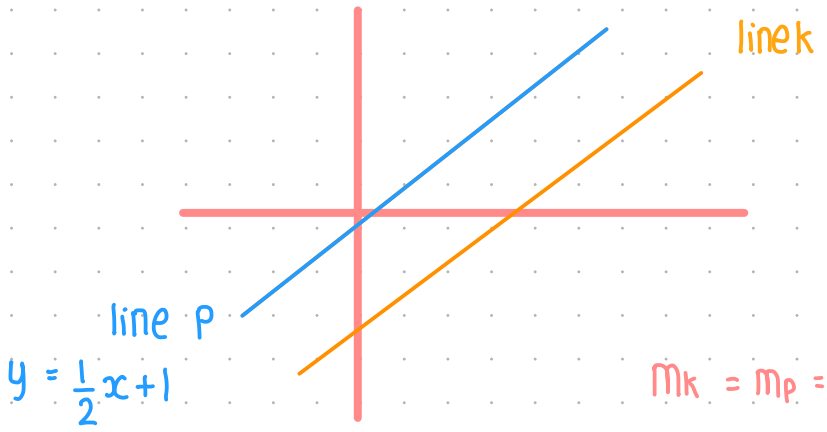
$m_k = \frac{3}{4}$ → (line P?)

$m_k \cdot m_P = -1$

$\frac{3}{4} \cdot m_P = -1$

$m_P = -\frac{4}{3}$

b) Paralel



$m_k = m_P = \frac{1}{2}$

LATSOL

1 Find the equation of the line with:

a gradient 2 passing through the point (4, 9)

b gradient −3 passing through the point (1, −4)

c gradient $-\frac{2}{3}$ passing through the point (−4, 3).

1. a. $m = \frac{2}{1}$ $(4, 9)$

Cara Dar

$2x - y = 2(4) - 9$

$= -1$

$y = 2x + 1$

Cara Biasa

$y - 9 = 2(x - 4)$

$y = 2x + 1$

c. $m = -\frac{2}{3}$, $(-4, 3)$

Cara Dar

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

$2x + 3y = 1$

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

Cara Biasa

$y - 3 = -\frac{2}{3}(x + 4)$

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

2 Find the equation of the line passing through each pair of points.

a $(1, 0)$ and $(5, 6)$

b $(3, -5)$ and $(-2, 4)$

c $(3, -1)$ and $(-3, -5)$

2. a. Cara Dar

$$m = \frac{6-0}{5-1} = \frac{3}{2}$$

$$3x - 2y = 3$$

Cara Biasa

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

$$\frac{y-0}{6-0} = \frac{x-1}{5-1}$$

$$\frac{y}{6} = \frac{x-1}{4}$$

$$2y = 3x - 3$$

c. Cara Dar

(gradien) $m = \frac{-4}{-6} = \frac{2}{3}$

(persamaan) $2x - 3y = 2(3) - 3(-1)$

$= 9$

$2x - 3y = 9$

3 Find the equation of the line:

a parallel to the line $y = 3x - 5$, passing through the point $(1, 7)$

b parallel to the line $x + 2y = 6$, passing through the point $(4, -6)$

c perpendicular to the line $y = 2x - 3$, passing through the point $(6, 1)$

d perpendicular to the line $2x - 3y = 12$, passing through the point $(8, -3)$.

3.a. $y = 3x - 5$ $m = 3$ $(1, 7)$

$y = mx + c$ (karena paralel)

$= 3x - y = -4$

$y = 3x + 4$

b. $y = \frac{6 - x}{2}$ $m = -\frac{1}{2}$ $(4, -6)$

$y + 6 = -\frac{1}{2}(x - 4)$

$y + 6 = -\frac{1}{2}x + 2$

$2y + x = -8$

c. Perpendicular

$y = 2x - 3$

$y - 2x = -3$

$2y + x = 2 + 6$

$y = 2x - 3$

$m_1 = 2$

$m_2 = -\frac{1}{2}$

$x + 2y = 8$

d. $2x - 3y$

$3x + 2y = 24 - 6$

$3x + 2y = 18$

$2x - 3y = 12$

$3y = 2x - 12$

$y = \frac{2}{3}x - 12$

$m = \frac{2}{3}$

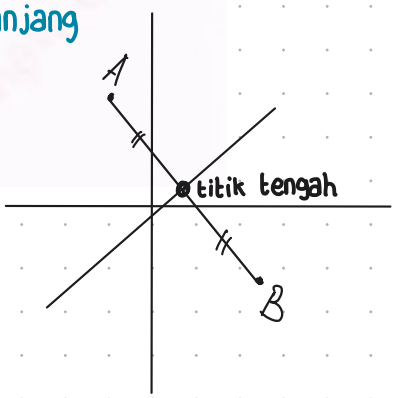
4 Find the equation of the perpendicular bisector of the line segment joining the points:

a (5, 2) and (−3, 6)

b (−2, −5) and (8, 1)

c (−2, −7) and (5, −4).

bagi 2 sama panjang



1) Cari gradien

2) cari mid point AB

3) gradien tegak lurus ($m_1 . m_2 = -1$)

4) Buat persamaan

Perpendicular bisector AB?
berpotongan bagi 2 sama panjang

4. a. Perpendicular

① Cari m

$m = \frac{6-2}{3-5}$

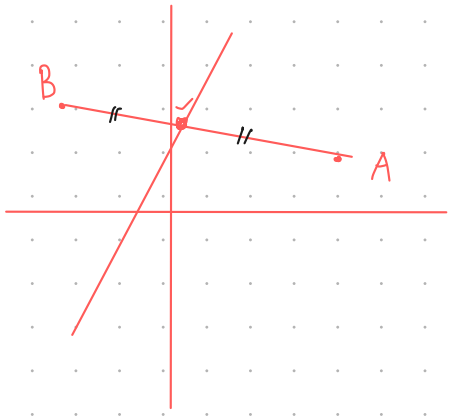
$= -\frac{4}{8}$

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

$m_1 . m_2 = -1$

$-\frac{1}{2} \cdot m_2 = -1$

$m_2 = 2$



② Cari Mid Point

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

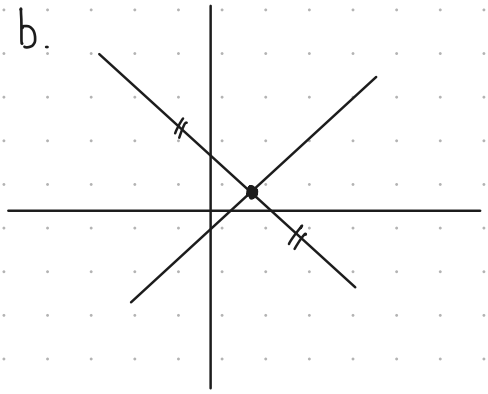
$= \left(\frac{5-3}{2}, \frac{2+6}{2} \right) = (1, 4)$

③ Buat persamaan

$2x - y = 2 - 4$

$2x - y = -2$

b.



① Gradien

$$m = \frac{1+5}{8+2} = \frac{3}{5}$$

② Mid Point

$$= \left(\frac{-2+8}{2}, \frac{-5+1}{2} \right)$$

$$= (3, -2)$$

③ Ubah Gradien

$$m_1 \cdot m_2 = -1$$

$$\frac{3}{5} \cdot m_2 = -1$$

$$m_2 = -\frac{5}{3}$$

④ Persamaan

$$5x + 3y = 15 - 6$$
$$= 9$$

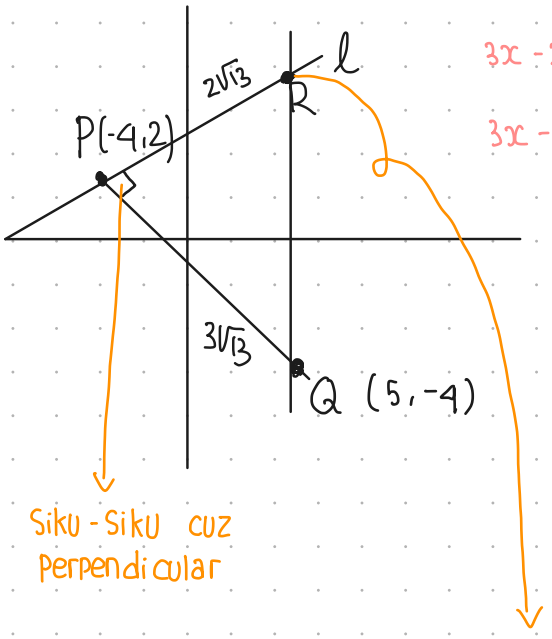
6 P is the point $(-4, 2)$ and Q is the point $(5, -4)$.

A line, l, is drawn through P and perpendicular to PQ to meet the y-axis at the point R.

a Find the equation of the line l.

b Find the coordinates of the point R.

c Find the area of triangle PQR.



Siku - Siku cuz Perpendicular

$3x - 2y = -12 - 4$

$3x - 2y = -16$

① Gradien

$m = -\frac{6}{9} = -\frac{2}{3}$

② $m_1 \cdot m_2 = -1$

$-\frac{2}{3} \cdot m_2 = -1$

$m_2 = \frac{3}{2}$

$0 - 2y = 16$

$y = 8$

$R(0, 8)$

$P(-4, 2)$

$Q(5, -4)$

$R(0, 8)$

$d = \sqrt{(\Delta x)^2 - (\Delta y^2)}$

$PR = \sqrt{16 + 36}$

$= \sqrt{52}$

$= 2\sqrt{13}$

$PQ = \sqrt{81 + 36}$

$= \sqrt{117}$

$= 3\sqrt{13}$

QR?

$= \frac{3\sqrt{13} \cdot 2\sqrt{13}}{2}$

$= 3 \cdot 13 = 39$

HOW TO SOLVE?

① Gambar PQ

② Analisis soal (garis ℓ , tegak lurus PQ & melewati P)

③ Cari gradien , jangan lupa $m_1 . m_2 = -1$

④ Buat persamaan dari titik P & gradien

⑤ Kalo bertemu y-axis , $x = 0$, berarti $y = 8$, buat cari R

⑥ Cari PQ , PR & QR

Makasii Dar n Putra