

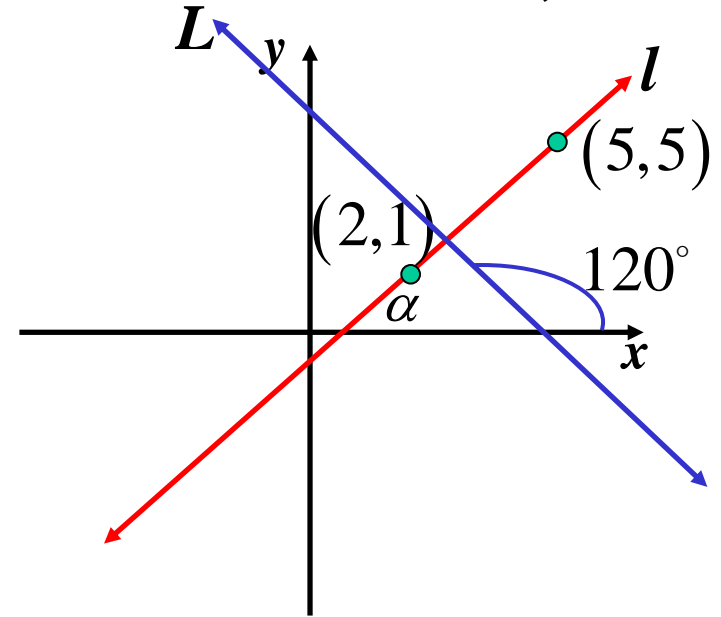
The Slope (Gradient)

$$(1) \quad m = \frac{\text{vertical rise}}{\text{horizontal run}}$$

$$(2) \quad m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_l = \frac{5 - 1}{5 - 2}$$
$$= \underline{\underline{\frac{4}{3}}}$$

(3) $m = \tan \theta$
 θ is the angle of inclination
with the positive x axis



$$m_L = \tan 120^\circ$$
$$= \underline{\underline{-\sqrt{3}}}$$

$$m_l = \tan \alpha$$
$$\tan \alpha = \frac{4}{3}$$

$$\underline{\underline{\alpha = 53^\circ}}$$

Two lines are parallel iff they have the same slope

$$\text{i.e. } m_1 = m_2$$

Two lines are perpendicular iff their slopes are the negative inverse of each other

$$\text{i.e. } m_1 \times m_2 = -1$$

e.g. A , B , C and D are the points $(1,1)$, $(2,3)$, $(3,2)$ and $(a,4)$

Find a such that;

(a) $AB \parallel CD$

$$m_{AB} = \frac{3-1}{2-1}$$

$$= 2$$

$$m_{CD} = \frac{4-2}{a-3}$$

$$= \frac{2}{a-3}$$

If $AB \parallel CD$ then

$$m_{AB} = m_{CD}$$

$$2 = \frac{2}{a-3}$$

$$a-3 = 1$$

$$\underline{a = 4}$$

(b) $AB \perp CD$

If $AB \perp CD$ then

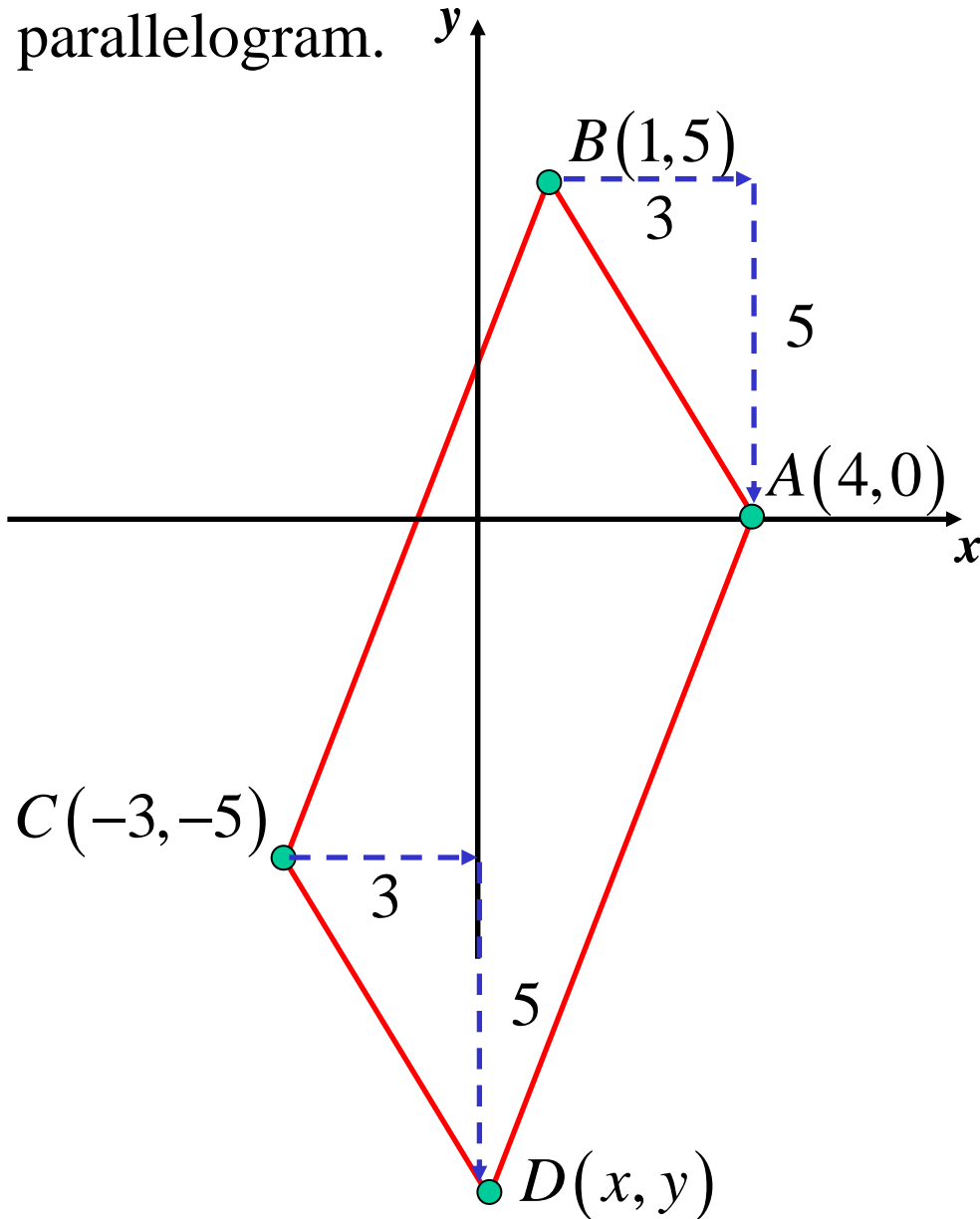
$$m_{AB} \times m_{CD} = -1$$

$$2 \times \frac{2}{a-3} = -1$$

$$4 = -a + 3$$

$$\underline{a = -1}$$

- (ii) $A(4,0)$, $B(1,5)$ and $C(-3,-5)$ are three vertices of a parallelogram $ABCD$. Find the coordinates of D , the fourth vertex of the parallelogram.



$$\begin{aligned} D &= (-3 + 3, -5 - 5) \\ &= \underline{\underline{(0, -10)}} \end{aligned}$$

To prove three points (A, B, C) are collinear;

(i) find m_{AB}

(ii) find m_{AC}

(iii) if $m_{AB} = m_{AC}$ then A, B, C are collinear

**Exercise 5B; 2ace, 3bd, 4 *ii, iv*, 5ae, 8, 9a, 11ac,
13, 15, 18, 19, 20, 24***