

(1) (a) Draw $y - 3 = 2x$.

(b) Write the equation of the straight line parallel to the line in (a) that passes through the origin. Draw this line on the same system of axes than the line in (a).

(c) Determine the simultaneous solution of the two lines in (a) and (b).

(a) $y = 2x + 3$

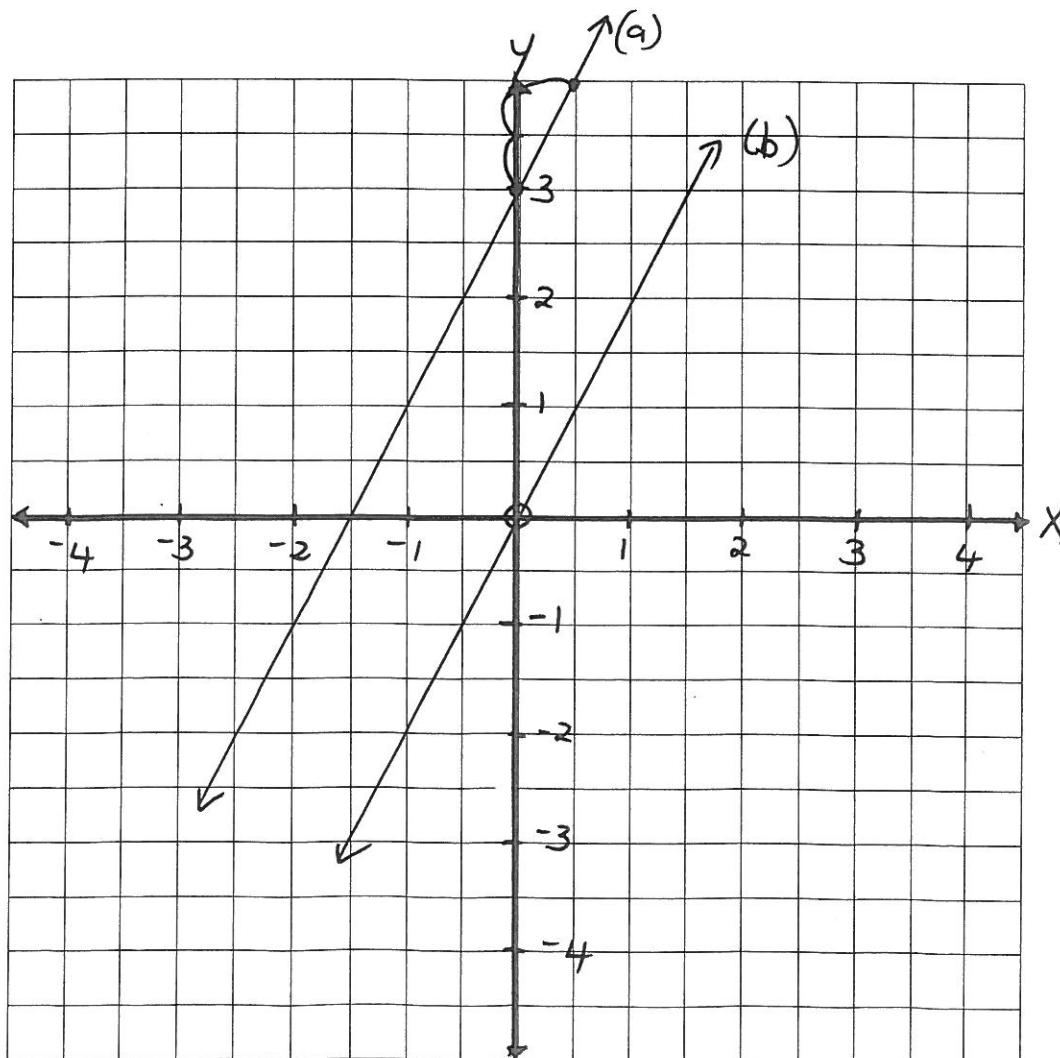
$m = \frac{+2}{+1} \rightarrow c = 3$

(b) origin $\rightarrow (0; 0)$ with $m = 2$ ($//$ lines)

$\therefore y = 2x + 0$

$\therefore y = 2x$

(c) lines (a) and (b) $\Rightarrow$ no simultaneous solution, because the lines are parallel.



(2) Determine whether the point $(2; -2)$ lies on the following straight lines:

(a) $y - 3x = 1$

(b) $y + 2x = 2$

$$\begin{aligned} \text{LHS} &= y - 3x & \text{RHS} &= 1 \\ &= -2 - 3(2) \\ &= -2 - 6 \\ &= -8 \\ \therefore \text{LHS} &\neq \text{RHS} \end{aligned}$$

$$\begin{aligned} \text{LHS} &= y + 2x & \text{RHS} &= 2 \\ &= -2 + 2(2) \\ &= -2 + 4 \\ &= 2 \\ \therefore \text{LHS} &= \text{RHS} \end{aligned}$$

$\therefore (2; -2)$ doesn't lie on the line!

$\therefore (2; -2)$ lies on the line.

(3) Determine whether the following pairs of lines are parallel, perpendicular or neither:

(a) $2x - 2y = 6$ and $x - y - 2 = 0$

(b) $\frac{2y}{3} + 1 = x$ and $x + y = 0$

$$\begin{aligned} \frac{-2y}{-2} &= \frac{-2x+6}{-2} & x-2 &= y \\ \therefore y &= x-2 \end{aligned}$$

$$\begin{aligned} 2y+3 &= 3x & y &= -x \\ \frac{2y}{2} &= \frac{3x-3}{2} \end{aligned}$$

$$y = x - 3$$

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

$$\therefore m_1 = 1$$

$$m_2 = 1$$

$$\therefore m_1 = \frac{3}{2}$$

$$m_2 = -1$$

$$\therefore m_1 = m_2$$

$$m_1 \neq m_2 \text{ and } m_1 \times m_2 \neq -1$$

$\therefore$ The lines are //

$\therefore$ the lines are neither // nor $\perp$.

(4) Determine the value p if $2px - 5 = y$ is perpendicular to $4y - 2x = 4$.

$$2px - 5 = y$$

$$\frac{4y}{4} = \frac{2x+4}{4}$$

$$\therefore y = 2px - 5$$

$$\therefore y = \frac{1}{2}x + 1$$

$$\therefore m_1 = 2p$$

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

$$\text{For } \perp \text{ lines : } m_1 \times m_2 = -1$$

$$\therefore 2p \times \frac{1}{2} = -1$$

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

$$\therefore p = -1$$