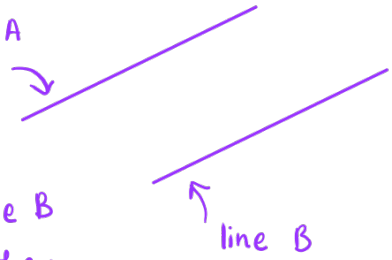
1 Here are the equations of two straight lines.

$$y = \frac{1}{2}x - 6 \qquad 6y = 3x + 7$$

Oscar says that these lines are parallel.

Is Oscar correct?
You must give a reason for your answer.



∴ line A and line B are parallel if they have the same gradient (m)

$m_A = m_B$

Equation in terms of $y = mx + c$:

$y = \frac{1}{2}x - 6$, $6y = 3x + 7$

$y = \frac{1}{2}x + \frac{7}{6}$ (1)

(1)

The gradient of both lines are the same which is $\frac{1}{2}$. Yes, Oscar are correct . The two lines are parallel to each other.

(Total for Question 1 is 2 marks)

2 The equation of line $\mathbf{L_1}$ is $y = 2x - 5$
The equation of line $\mathbf{L_2}$ is $6y + kx - 12 = 0$

$\mathbf{L_1}$ is perpendicular to $\mathbf{L_2}$

Find the value of k.
You must show all your working.

rewrite both lines in $y = mx + c$ form

$L_1 \Rightarrow \quad y = 2x - 5$ $\qquad$ $L_2 \Rightarrow \quad 6y + kx - 12 = 0$

$-kx \quad +12 \qquad -kx + 12$

$\div 6 \quad 6y = -kx + 12 \quad \div 6$

$y = -\frac{k}{6} + 2$ ✓(1)

Perpendicular Lines : gradients are negative reciprocals

L_1 gradient $= 2$

L_2 gradient has to be $-\frac{1}{2}$

$-\frac{1}{2} = -\frac{k}{6}$ $\quad \times 6 \quad \times 6$ ✓(1)

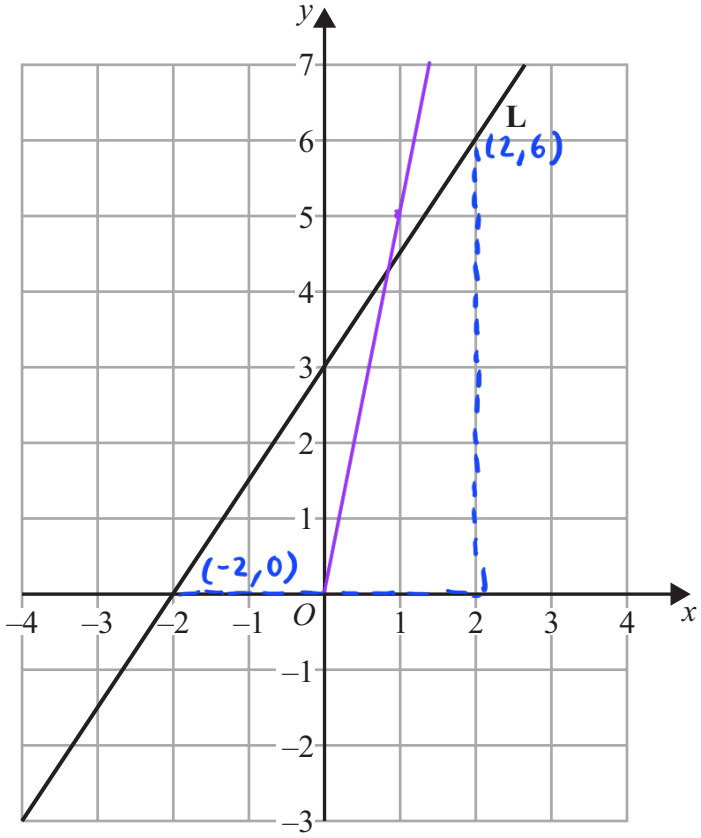
$-3 = -k$

$3 = k$

$k =$ 3 ✓(1)

(Total for Question 2 is 3 marks)

3 Here is a straight line **L** drawn on a grid.



(a) Find an equation for **L**.

For equation of a straight line : requires: x value, y value and a gradient.

Finding gradient :

$m = \frac{6-0}{2-(-2)} = \frac{6}{4} = \frac{3}{2}$ (1)

Equation of L : $y = \frac{3}{2}x + 3$ (1)

At (2,6) : $6 = \frac{3}{2}(2) + c$ (1)

$c = 3$

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

(3)

M is a different straight line with equation $y = 5x$

(b) Write down the equation of a straight line parallel to **M**.

gradient M : 5

$y = 5x + c$, where $c \neq 0$ (1)

if c = 0, will be line M.

$y = 5x + c$

(1)

(Total for Question 3 is 4 marks)

4 **C** is a circle with centre (0, 0)
L is a straight line.

The circle **C** and the line **L** intersect at the points P and Q.
The coordinates of P are (5, 10)
The x coordinate of Q is –2

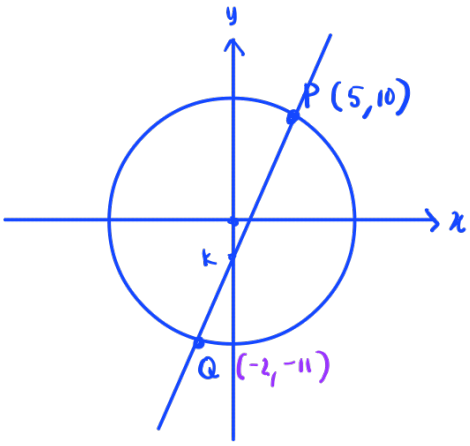
L has a positive gradient and crosses the y-axis at the point $(0, k)$

Find the value of k.

$x^2 + y^2 = 5^2 + 10^2$

$= 25 + 100$

$= 125$ (1)



Finding coordinate of Q : $(-2)^2 + y^2 = 125$

$y^2 = 125 - 4$

$y^2 = 121$ (1)

$y = \pm\sqrt{121} = -11$ (since Q cannot be higher than P with positive gradient) (1)

∴ coordinate of Q : $(-2, -11)$

Gradient, m of line L : $\frac{10-(-11)}{5-(-2)} = \frac{21}{7} = 3$

Equation of line L : $10 = 3(5) + c$ ← take point P (1)

$10 = 15 + c$

$c = -5$

$k = -5$ (1)

$k =$ −5

(Total for Question 4 is 5 marks)