5.3) Parallel and perpendicular lines

Worked example	Your turn
Determine whether the pairs of lines are parallel, perpendicular or neither: $$5x - 2y - 3 = 0$$ $$y = \frac{5}{2}x$$	Determine whether the pairs of lines are parallel, perpendicular or neither: $$3x - y - 2 = 0$$ $$x + 3y - 6 = 0$$ Perpendicular
$$5x + 3y - 21 = 0$$ $$3x - 5y + 2 = 0$$	$$y = \frac{1}{2}x$$ $$2x - y + 4 = 0$$ Neither parallel nor perpendicular

Worked example	Your turn
The points A, B and C have coordinates $(0, 12)$, $(-3, 0)$ and $(0, c)$ respectively. The line through points A and B is perpendicular to the line through points B and C. Find the value of c	The points A, B and C have coordinates $(0, 6)$, $(-2, 0)$ and $(0, c)$ respectively. The line through points A and B is perpendicular to the line through points B and C. Find the value of c $$x = -\frac{2}{3}$$

Worked example	Your turn
Find the gradient of the perpendicular line to: $y = 2x + 3$	Find the general equation of the perpendicular line to: $y = 4x$ $\qquad$ $\textcolor{red}{y = -\dfrac{1}{4}x + c}$
$y = 2 - 3x$	$y = -2x + 4$ $\qquad$ $\textcolor{red}{y = \dfrac{1}{2}x + c}$
$y = \dfrac{2}{3}x + 1$	$y = \dfrac{3}{4}x - 5$ $\qquad$ $\textcolor{red}{y = -\dfrac{4}{3}x + c}$
$y = 8 - \dfrac{11}{5}x$	$y = 7 - \dfrac{11}{3}x$ $\qquad$ $\textcolor{red}{y = \dfrac{3}{11}x + c}$

Worked example	Your turn
Find the equation of the line parallel to $y = 3x + 5$ that passes through $(-2, 5)$	Find the equation of the line parallel to $y = -\frac{1}{2}x - 3$ that passes through $(-2, 5)$ $$y = -\frac{1}{2}x + 4$$

Find the equation of the line parallel to $y = -\frac{1}{3}x - 4$ that passes through $(-2, 5)$

Worked example	Your turn
Find the equation of the line perpendicular to $y = 2x - 4$ that passes through $(-2, 5)$	Find the equation of the line perpendicular to $y = 3x + 2$ that passes through $(9, -7)$
	$$y = -\frac{1}{3}x - 4$$

Find the equation of the line perpendicular to $y = 4x + 5$ that passes through $(-2, 5)$

Worked example	Your turn
Find the equation of the line perpendicular to $y = \frac{1}{2}x - 4$ that passes through $(-2, 5)$	Find the equation of the line perpendicular to $y = -\frac{4}{3}x + 3$ that passes through $(-12, -5)$ $$y = \frac{3}{4}x + 4$$
Find the equation of the line perpendicular to $y = -\frac{2}{3}x + 5$ that passes through $(-2, 5)$	

Worked example	Your turn
Find the equation of the line perpendicular to $x + 2y = 5$ which passes through the point $(3, 7)$	Find the equation of the line perpendicular to $2x + 3y = 5$ which passes through the point $(4, 7)$ $$y = \frac{3}{2}x + 1$$
Find the equation of the line perpendicular to $3x + 2y = 5$ which passes through the point $(3, 7)$	

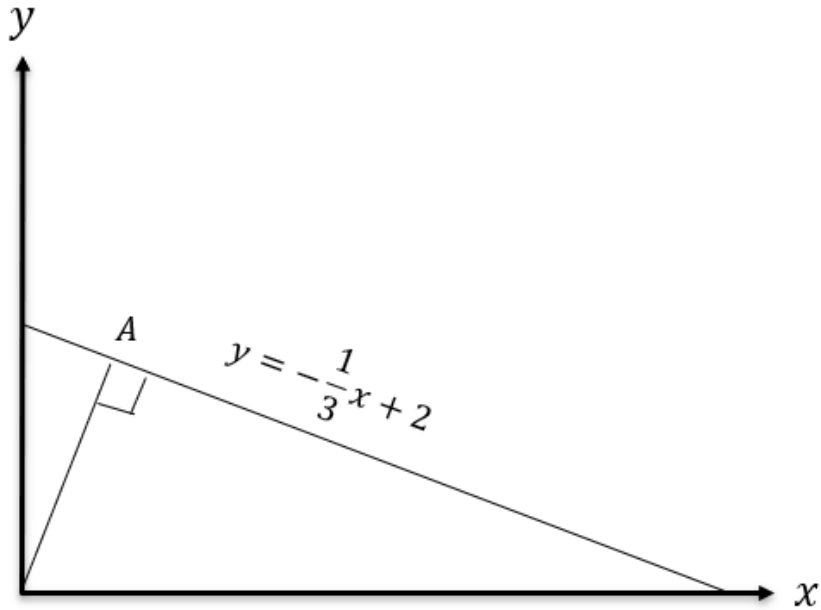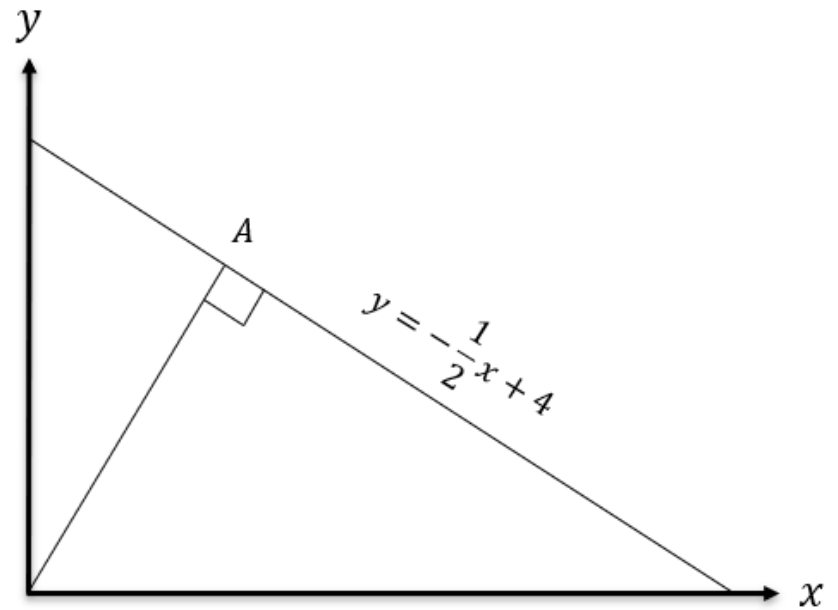| Worked example	Your turn
Write down an equation of a line parallel to $y = 3x - 4$ which passes through the origin.	Write down an equation of a line parallel to $y = -2x + 5$ which passes through the origin. $y = -2x$
Write down an equation of a line parallel to $y = 3 - 4x$ which passes through the origin.	

Worked example	Your turn
Determine the coordinates of A	Determine the coordinates of A

Worked example diagram: $y = -\frac{1}{3}x + 2$

Your turn diagram: $y = -\frac{1}{2}x + 4$

$$\left(\frac{8}{5}, \frac{16}{5}\right)$$