Samples **Equation of a straight line SOLUTIONS**

1. To find the equation of the new line, we first need the gradient of the original line. Now,

$$\begin{aligned} 8y &= 32 + 16x, \text{ so} \\ y &= 2x + 4 \end{aligned}$$

Hence the gradient of the original line is $m_0 = 2$.
The new line is perpendicular to the original line, so the new line has gradient $m = -\dfrac{1}{m_0}$. Hence $m = -\dfrac{1}{2}$.
Thus the equation of the line is $y = -\dfrac{1}{2}x + c$ and we can substitute the coordinates of the point $(x_1, y_1) = (-18, -1)$ into this equation to get the value of c:
$-1 = -\dfrac{1}{2} \times (-18) + c$, so $-1 = 9 + c$. Hence $c = -1 - 9 = -10$.
Hence the equation of the line is $y = -\dfrac{1}{2}x - 10$.

2. To find the equation of the new line, we first need the gradient of the original line. Now,

$$\begin{aligned} -3y - 6x &= 3, \text{ so} \\ -3y &= 6x + 3 \\ y &= -2x - 1 \end{aligned}$$

Hence the gradient of the original line is $m_0 = -2$.
The new line is perpendicular to the original line, so the new line has gradient $m = -\dfrac{1}{m_0}$. Hence $m = \dfrac{1}{2}$.
Thus the equation of the line is $y = \dfrac{1}{2}x + c$ and we can substitute the coordinates of the point $(x_1, y_1) = (0, -10)$ into this equation to get the value of c:
$-10 = \dfrac{1}{2} \times 0 + c$, so $-10 = c$.
Hence the equation of the line is $y = \dfrac{1}{2}x - 10$.

3. To find the equation of the new line, we first need the gradient of the original line. Now,

$$\begin{aligned} 36x &= 9y + 18, \text{ so} \\ -9y &= -36x + 18 \\ y &= 4x - 2 \end{aligned}$$

Hence the gradient of the original line is $m_0 = 4$.
The new line is perpendicular to the original line, so the new line has gradient $m = -\dfrac{1}{m_0}$. Hence $m = -\dfrac{1}{4}$.
Thus the equation of the line is $y = -\dfrac{1}{4}x + c$ and we can substitute the coordinates of the point $(x_1, y_1) = (-16, 1)$ into this equation to get the value of c:
$1 = -\dfrac{1}{4} \times (-16) + c$, so $1 = 4 + c$. Hence $c = 1 - 4 = -3$.
Hence the equation of the line is $y = -\dfrac{1}{4}x - 3$.