

ALGEBRA HL ②

SOLUTIONS

$$\begin{aligned} \textcircled{1} \quad 2x + 3y &= 0 \quad \textcircled{1} \\ x + y + z &= 0 \quad \textcircled{2} \\ 3x + 2y - 4z &= 9 \quad \textcircled{3} \end{aligned}$$

$$\begin{aligned} -2 \times \textcircled{1} &\Rightarrow -4x - 6y = 0 \\ \textcircled{3} &\Rightarrow \frac{3x + 2y = 9}{-4x - 6y = 0} \\ \hline 3x &= 9 \\ \boxed{x = 3} \end{aligned}$$

$$\begin{aligned} 4 \times \textcircled{2} &\Rightarrow 4x + 4y + 4z = 0 \\ \textcircled{3} &\Rightarrow \frac{3x + 2y - 4z = 9}{-4x - 6y = 0} \\ \hline 7x + 6y &= 9 \quad \textcircled{4} \end{aligned}$$

Sub in ①

$$6 + 3y = 0$$
$$\boxed{y = -2}$$

Sub in ②

$$3 - 2 + z = 0$$
$$\boxed{z = -1}$$

$$\begin{aligned} \textcircled{2} \quad \frac{2x + 3y}{x + 6y} &= \frac{4}{5} \\ \therefore 10x + 15y &= 4x + 24y \\ \therefore 6x &= 9y \\ \therefore \frac{x}{y} &= \frac{9}{6} = \boxed{\frac{3}{2}} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad x - c + 1 \text{ factor} &\Rightarrow \\ \Rightarrow x = c - 1 \text{ root} \end{aligned}$$

$$\begin{aligned} \therefore (c-1)^2 - 5(c-1) + 5c(c-1) - 6b^2 &= 0 \\ \therefore c^2 - 2c + 1 - 5c + 5 + 5c^2 - 5c - 6b^2 &= 0 \\ \therefore 6c^2 - 12c + 6 - 6b^2 &= 0 \\ \therefore c^2 - 2c + 1 - b^2 &= 0 \\ \therefore (c-1)^2 &= b^2 \end{aligned}$$

$$\begin{aligned} \therefore c - 1 &= \pm b \\ \therefore \boxed{c = 1 \pm b} \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad x &= y - 8 \\ \text{Sub in ②} \\ (y-8)^2 + (y-8)(z) + 8 &= 0 \\ \therefore y^2 - 16y + 64 + yz - 8y + 8 &= 0 \\ \therefore 2y^2 - 24y + 72 &= 0 \end{aligned}$$

$$\begin{aligned} \therefore y^2 - 12y + 36 &= 0 \\ \therefore (y-6)(y-6) &= 0 \end{aligned}$$

$$\begin{aligned} \therefore \boxed{y = 6} \\ \therefore x = 6 - 8 \\ \therefore \boxed{x = -2} \end{aligned}$$