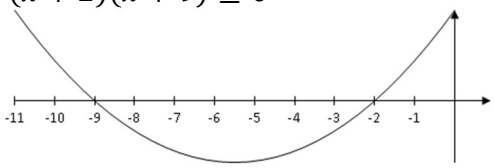
Question 1 **(25 marks)**

(a) Solve the simultaneous equations.

$$\begin{aligned} 2x + 3y - z &= -4 \\ 3x + 2y + 2z &= 14 \\ x - 3z &= -13 \end{aligned}$$

(b) Solve the inequality $\frac{2x-3}{x+2} \geq 3$, where $x \in \mathbb{R}$ and $x \neq -2$.

Q1	Model Solution – 25 Marks	Marking Notes
(a)	$(i)\quad 2x+3y-z=-4 \qquad \times(2)$ $(ii)\quad 3x+2y+2z=14 \qquad \times(-3)$ $4x+6y-2z=-8$ $-9x-6y-6z=-42$ $-5x-8z=-50$ $(iii)\quad x-3z=-13 \qquad \times(5)$ $-5x-8z=-50$ $5x-15z=-65$ $-23z=-115$ $z=5$ $\Rightarrow x=2$ $\Rightarrow y=-1 \qquad \{2,-1,5\}$	**Scale 15D (0, 5, 7, 11, 15)** *Low Partial Credit:* Matches coefficient of 1 variable in 2 equations Writes x in terms of z in eq (*iii*) *Mid Partial Credit:* 1 unknown found with errors Eliminates one unknown 1 unknown found and stops *High Partial Credit:* 2 unknowns found
(b)	$\dfrac{2x-3}{x+2}\geq 3 \qquad \times(x+2)^2$ $(2x-3)(x+2)\geq 3(x+2)^2$ $2x^2+x-6\geq 3x^2+12x+12$ $x^2+11x+18\leq 0$ $(x+2)(x+9)\leq 0$  $-9\leq x<-2$	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit* Use of $(x+2)^2$ Relevant work but with linear inequality Squares both sides with some subsequent work (low partial credit at most) *Mid Partial Credit:* Quadratic inequality involving 0 *High Partial Credit* Roots of quadratic found **Note**: Accept $-9\leq x\leq -2$