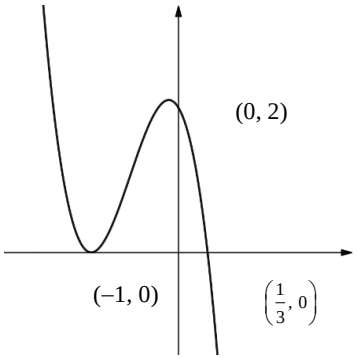
(b)		B1B1B1
		(3)
		Total 6

Notes:

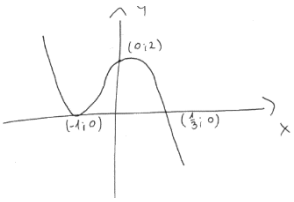
If there is any ambiguity regarding coordinates, the sketch takes precedence.

B1: Reflection in the *y*-axis. This requires a minimum on the negative *x*-axis and a maximum to the left of the *y*-axis in quadrant 2. If the maximum is on the *y*-axis score B0.
The curve must continue upwards to the left of the *y*-axis to reach a maximum in quadrant 2.
The curve must extend into quadrant 4 as shown.

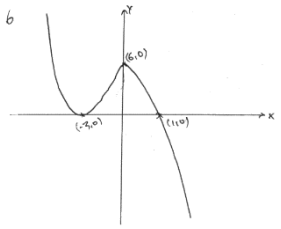
B1: Minimum at (−1, 0). Allow just −1 marked in the correct place and condone (0, −1) as long as it is marked in the correct place. Allow to score away from the sketch but must be identified correctly as (−1, 0) and correspond to the sketch.

B1: Passes through (0, 2) and passes through or touches $\left(\frac{1}{3}, 0\right)$. For both points, allow just the intercepts marked in the correct place and condone (2, 0) and/or $\left(0, \frac{1}{3}\right)$ as long as they are marked in the correct place. Allow to score away from the sketch but must be identified correctly as (0, 2) and $\left(\frac{1}{3}, 0\right)$ and correspond to the sketch.

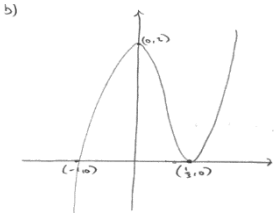
See examples below:



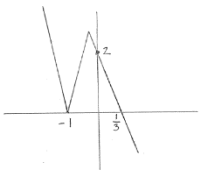
B0: Maximum in quadrant 2
B1: Minimum at (−1, 0)
B1: Passes through (0, 2) and $\left(\frac{1}{3}, 0\right)$



B0: Maximum on the *y*-axis (we would have tolerated the slight "pointy" maximum)
B0: Minimum at (−2, 0)
B0: Does not pass through (0, 2) and $\left(\frac{1}{3}, 0\right)$



B0: Not a reflection in the *y*-axis
B0: No minimum at (−1, 0)
B1: Passes through (0, 2) and touches $\left(\frac{1}{3}, 0\right)$



B0: Must be a curve – a reflection in the *y*-axis with the same shape.
B1: Minimum at (−1, 0)
B1: Passes through (0, 2) and $\left(\frac{1}{3}, 0\right)$

Question	Scheme	Marks
4(a)	$x^2+kx-9=-3x^2-5x+k \Rightarrow 4x^2+kx+5x-9-k\,(=0)$	M1
	$b^2-4ac=0 \Rightarrow (k+5)^2-4\times4(-9-k)=0$	M1
	$k^2+26k+169=0*$	A1*
		(3)
(b)	$k^2+26k+169=0 \Rightarrow k=-13$	B1
	$k=-13 \Rightarrow 4x^2-8x+4=0 \Rightarrow x=...$	M1
	$(1,-21)$	A1
		(3)
		Total 6

Notes:

Mark (a) and (b) together

(a)

M1: Equates both curves and collects terms to one side. Allow slips but there must be some attempt to collect terms to one side. The " = 0" may be implied by their attempt at the discriminant.

M1: Attempts to find the discriminant "b^2-4ac" of a 3TQ. May be seen as an attempt at e.g. $b^2-4ac=0$ or equivalent e.g. $b^2=4ac$ or may be seen embedded in an attempt at the quadratic formula.
It requires *b* and *c* both of the form $pk+q,\quad p,q\neq0$ and requires *a* as a constant.
If clearly a wrong formula/expression is used e.g. "b^2+4ac" this scores M0

A1*: Achieves the printed answer with no errors and sufficient working shown.
The " = 0" must appear at least once before the printed answer unless they start with $b^2=4ac$.

(b)

B1: Correct value of *k*. Condone $x=-13$ if it is subsequently used as a value for *k*.

M1: Either:

- substitutes their value of *k* into their equation obtained by equating the curves and collecting terms from part (a) and solves a 3TQ for *x* by any correct method including a calculator **or**
- substitutes their *k* into the 2 given equations, equates, collects terms to one side and solves a 3TQ for *x* by any correct method including a calculator

A1: Correct coordinates. Allow as e.g. $x = 1,\quad y = -21$

Correct answer only in (b) scores 3/3