

Question Number	Scheme	Marks	AOs
3 (a)	$8x^3 + 31x^2 - 4x = x(8x^2 + 31x - 4) = x(ax + b)(cx + d)$ with $ac = \pm 8, bd = \pm 4$	M1	1.1b
	$= x(8x - 1)(x + 4)$	A1	1.1b
		(2)	
(b)	Deduces $4^y = \frac{1}{8}$	M1	1.1b
	$y = -\frac{3}{2}$ only	A1	1.1b
		(2)	
(4 marks)			
Notes:			

- (a) Condone any spurious = 0 throughout part (a).
- Ignore any attempts to solve the cubic = 0, including attempts by completing the square, the quadratic formula or simply writing the roots down.
- M1:** Attempts to factorise by taking out/cancelling a factor of x or e.g. $8x$ and factorises the remaining quadratic factor using the usual rules to achieve $(ax + b)(cx + d)$ with $ac = \pm 8, bd = \pm 4$ so allow e.g. $8x^3 + 31x^2 - 4x \rightarrow (8x^2 \pm 31x \pm 4) \rightarrow (4x + 1)(2x - 4)$
- or $ac = \pm 1, bd = \pm \frac{1}{2}$ so allow e.g. $8x^3 + 31x^2 - 4x \rightarrow \left(x^2 \pm \frac{31}{8}x \pm \frac{1}{2}\right) \rightarrow (x + 2)\left(x - \frac{1}{4}\right)$
- Condone incorrect work that is recovered, e.g.
- $$8x^2 + 31x - 4 \rightarrow (8x \pm 1)(8x \pm 32) \rightarrow (8x \pm 1)(x \pm 4)$$
- Alternatively, divides the cubic by either $(x \pm 4)$ or $(8x \pm 1)$ or $\left(x \pm \frac{1}{8}\right)$ and then takes out a factor of x or $8x$ from the remaining quadratic.
- Condone e.g. $(x + 0)(8x - 1)(x + 4)$ for this mark.
- A1:** cao $x(8x - 1)(x + 4)$ or $8x\left(x - \frac{1}{8}\right)(x + 4)$ or e.g. $4x\left(2x - \frac{1}{4}\right)(x + 4)$ appearing on one line.
- Correct answer only scores both marks. Note that e.g. $(x + 0)(8x - 1)(x + 4)$ scores A0.
- Note that if they divide by x or $8x$ and then recover it for the final answer then they may score full marks.
- $$8x^3 + 31x^2 - 4x \rightarrow 8x^2 + 31x - 4 \rightarrow (8x - 1)(8x + 32) \rightarrow x(8x - 1)(x + 4)$$
- scores M1A1.
- Apply ISW if they factorise correctly but then go on to solve and write down any roots.

(b)

M1: Deduces that 4^y equals any positive non-zero root from their $x(8x-1)(x+4)=0$

Alternatively, they may deduce e.g. $16^y = \left(\frac{1}{8}\right)^2$ or $64^y = \left(\frac{1}{8}\right)^3$

A1: $y = -\frac{3}{2}$ only o.e. with logs removed. Must follow $(8x-1)$ seen as a factor.

Any other roots for y seen must be rejected or $y = -\frac{3}{2}$ clearly selected.

Correct answer only (with no method) scores M0A0.

A minimally acceptable solution is $4^y = \frac{1}{8} \Rightarrow y = -\frac{3}{2}$

Does not need to be labelled as y but must clearly be their answer.

May come from e.g. $y = \frac{\log\left(\frac{1}{8}\right)}{\log 4} = -\frac{3}{2}$ without further work and/or evidence of use of base 2,

or it may come directly from $\log_4\left(\frac{1}{8}\right) = -\frac{3}{2}$