	$-a+6a+8+a^2=32 \Rightarrow a^2+5a-24=0$ $(a+8)(a-3)=0$ $a=3$ or $a=-8$ and chooses $a=3$ with reason *	M1 dM1 A1* cso
		(3)
(ii)	$3x^3+26x^2-9x=0 \Rightarrow x(3x^2+26x-9)=0$ $x(3x-1)(x+9)$ $(x=)\ 0, \frac{1}{3}, -9$	M1 A1
		(2)
(b)(i)	$(y=)\ 0$ $y^{\frac{1}{3}}="\frac{1}{3}" \text{ or } y^{\frac{1}{3}}="-9" \Rightarrow y=...$ (or $(-9)^3=...$ or $\left(\frac{1}{3}\right)^3=...$) $(y=)\ \frac{1}{27},\ -729$	B1 M1 A1
		(3)
(b)(ii)	$9^z="\frac{1}{3}" \rightarrow z=...$ $(z=)\ -\frac{1}{2}$ only	M1 A1
		(2)
		(10 marks)

(a)(i)

M1 Substitutes in $x=\pm 1, y=32$ and proceeds to a 3TQ in terms of *a* with all terms on one side of the equation. Condone the lack of = 0 and condone slips in their rearrangement.

dM1 Attempts to solve their quadratic equation by either factorising, completing the square or the quadratic formula. They cannot just state the roots. It is dependent on the first method mark. In all cases they must show their working to score this mark so:

- Solving by factorising requires the factorised form of their $a^2+5a-24=0$ to be stated before proceeding to the roots i.e $(a+"8")(a-"3")\ (=0)$
- Solving by using the quadratic formula requires the values for *a*, *b* and *c* to be stated in the formula before proceeding to the roots. They cannot just state the values of *a*, *b* and *c*.

- Solving by completing the square requires eg $\left(a \pm "\frac{5}{2}"\right)^2 \pm ...$ before rearranging to find the roots.

A1* $a = 3$ or $a = -8$ and chooses $a = 3$ with a minimal reason. Eg "as a is a positive constant" or "Since $a > 0$", "a cannot be negative".
The final mark cannot be scored without the previous method marks being scored and there cannot be any errors even if missing brackets are recovered. Just crossing out -8 without a reason is A0.

(a)(ii)

M1 Takes out a factor of x from the given cubic with $a = 3$ (or divides through by x) and attempts to solve the resulting quadratic equation. You must see at least one intermediate line of working before proceeding to the roots eg the factorised form, values in the quadratic formula or completed square form.

A1 $(x =)\ 0,\ \frac{1}{3},\ -9$ provided M1 has been scored.
Solutions with no working in this part scores 0 marks.

(b)(i)

B1 $(y =)\ 0$

M1 Sets $y^{\frac{1}{3}}$ equal to any of their non-zero solutions from part (a) and attempts to cube their value to find a value for y. You must see at least one stage of working to score this mark.
$(-9)^3 = ...$ on its own scores M1.

A1 $(y =)\ \frac{1}{27}, -729$ and no others other than 0.
Solutions without any working will score a maximum of B1M0A0 in this part.

(ii)

M1 Sets 9^z equal to any of their positive solutions found in part (a) and proceeds to find a value for z. They may write 9^z as 3^{2z} before proceeding to find a value for z.
Alternatively, you may see attempts to link b(i) and b(ii) together:
Eg $y = 9^{3z} \Rightarrow \frac{1}{27} = 729^z \Rightarrow z = ...$ which can score M1.
You must see at least one stage of working to score this mark.
The method may include log statements which is acceptable.

A1 $(z =)\ -\frac{1}{2}$ only (provided M1 has been scored).
Answer stated without working scores 0 marks. Evidence of calculator use will also be A0.

Question Number	Scheme	Marks
3(a)	$\left(2\sqrt{2}\right)^2 = p^2 + q^2 - 2pq\cos 60°$ oe	M1
	$p^2 + q^2 - pq = 8$ *	A1*
		(2)
(b)	$q = p + 2 \Rightarrow 8 = p^2 + (" p + 2")^2 - p(" p + 2")$	M1
	$p^2 + 2p - 4 = 0$ or $q^2 - 2q - 4 = 0$	A1
	$p = \frac{-2 \pm \sqrt{2^2 - 4\times 1\times(-4)}}{2}$ or $q = \frac{2 \pm \sqrt{(-2)^2 - 4\times 1\times(-4)}}{2}$	M1
	$p = -1 + \sqrt{5}$ or $q = 1 + \sqrt{5}$	B1 (A1 on EPEN)
	$p = -1 + \sqrt{5}$ and $q = 1 + \sqrt{5}$ only	A1cso
		(5)
(c)	$\text{Area} = \frac{1}{2} \times (" -1 + \sqrt{5} ")(" 1 + \sqrt{5} ") \times \sin 60°$	M1
	Area = $\sqrt{3}$ (m^2)	A1
		(2)
Alt(a)	Forming a line BX which is perpendicular to AC where X is on the line AC.	
	$AX = p\cos 60 = \frac{p}{2}$	
	$BX = \sqrt{p^2 - \left(\frac{p}{2}\right)^2} = \frac{\sqrt{3}}{2}p$ or $BX = p\sin 60$	
	$\left(\frac{\sqrt{3}}{2}p\right)^2 + \left(q - \frac{p}{2}\right)^2 = \left(2\sqrt{2}\right)^2$ or $(p\sin 60)^2 + \left(q - \frac{p}{2}\right)^2 = \left(2\sqrt{2}\right)^2$	M1
	$\frac{3p^2}{4} + q^2 - pq + \frac{p^2}{4} = 8$	
	$p^2 + q^2 - pq = 8$ *	A1*
		(9 marks)

(a)