3(a)	$2\log(4-x)=\log(4-x)^2$	B1	1.2
	$2\log(4-x)=\log(x+8)\Rightarrow\log(4-x)^2=\log(x+8)$ $(4-x)^2=(x+8)$ **or** $2\log(4-x)=\log(x+8)\Rightarrow\log(4-x)^2-\log(x+8)=0$ $\frac{(4-x)^2}{(x+8)}=1$	M1	1.1b
	$16-8x+x^2=x+8\Rightarrow x^2-9x+8=0$ *	A1*	2.1
		(3)	
	(a) Alternative - working backwards:		
	$x^2-9x+8=0\Rightarrow(4-x)^2-x-8=0$	B1	1.2
	$\Rightarrow(4-x)^2=x+8$ $\Rightarrow\log(4-x)^2=\log(x+8)$	M1	1.1b
	$\Rightarrow 2\log(4-x)=\log(x+8)$ * Hence proved.	A1	2.1
(b)	(i) (x =) 1, 8	B1	1.1b
	(ii) 8 is **not** a solution as log(4 – 8) cannot be found	B1	2.3
		(2)	
			(5 marks)

Notes:

(a)

B1: States or uses $2\log(4-x)=\log(4-x)^2$

M1: Correct attempt at eliminating the logs to form a quadratic equation in x.

Note that this may be implied by e.g. $\log\frac{(4-x)^2}{(x+8)}=0\Rightarrow(4-x)^2=x+8$

A1*: Proceeds to the given answer with at least one line where the $(4-x)^2$ has been multiplied out.
There must be no errors or omissions but condone invisible brackets around the arguments of the logs e.g. allow $\log 16-8x+x^2$ for $\log(16-8x+x^2)$ and $\log x+8$ for $\log(x+8)$

Note we will allow a start of $(4-x)^2=x+8$ with no previous work for full marks.

Some examples of how to mark (a) in particular cases:

$$2\log(4-x)=\log(x+8)\Rightarrow\log(4-x)^2=\log(x+8)\Rightarrow\frac{\log(4-x)^2}{\log(x+8)}=1$$

$$2\log(4-x)=\log(x+8) \Rightarrow \log(4-x)^2-\log(x+8)=0 \Rightarrow (4-x)^2-x-8=0$$

$$\Rightarrow 16-8x+x^2-x-8 \Rightarrow x^2-9x+8=0$$

Scores B1M1A1

$$2\log(4-x)=\log(x+8) \Rightarrow \log(4-x)^2-\log(x+8)=0 \Rightarrow \frac{\log(4-x)^2}{\log(x+8)}=0$$

$$\Rightarrow \frac{(4-x)^2}{(x+8)}=1 \Rightarrow 16-8x+x^2=x+8 \Rightarrow x^2-9x+8=0$$

Scores B1M0A0

(a) Alternative:

B1: Writes $x^2 - 9x + 8 = 0$ as $(4 - x)^2 - x - 8 = 0$ or equivalent

M1: Proceeds correctly to reach $\log(4-x)^2=\log(x+8)$

A1: Obtains $2\log(4-x)=\log(x+8)$ and makes a (minimal) conclusion e.g. hence proved, QED, #, square etc.

(b)

B1: Writes down (x =) 1, 8

B1: Chooses 8 (no follow through here) and gives a reason why it should be rejected by referring to logs and which log it is.

They must refer to the 8 as the required value but allow e.g. $x \neq 8$ and there must be a reference to $\log(4 - x)$ or log of lhs or log(–4) or the 4 – 8. Some acceptable reasons are: log(–4) can't be found/worked out/is undefined, log(–4) gives math error, log(–4) = n/a, lhs is log(negative) so reject, you can't do the log of a negative number which would happen with 4 – 8

Do **not** allow "you can't have a negative log" unless this is clarified further and do **not** allow "you get a math error" in isolation

There must be no contradictory statements.

Note that this is an independent mark but must have x = 8 (i.e. may have solved to get x = –1, 8 for first B mark)