

Question			Answer	Marks	AO	Guidance
6	(a)		Explanation, e.g. - The function is positive for all integers so there will be no change of sign - There are two roots between 2 and 3 but the student only checks integers	B1 [1]	2.4	See appendix - Or f(2) and f(3) both positive so no change of sign - Or there are two roots between 2 and 3 which will be missed - Must mention integers if they don't explicitly state 2 and 3 - ignore attempts to evaluate f(2) and f(3) - Must have either 'no sign change' or 'two roots'
	(b)		$\frac{dy}{dx} = 13 - \frac{34}{x} = 0$ $x = \frac{34}{13} \text{ or } 2\frac{8}{13}$	M1 A1 [2]	1.1a 1.1	- Differentiation and setting equal to zero. - Constant must differentiate to zero; sign errors condoned. - Allow for $13 + \frac{k}{x} = 0$ where k is a non-zero constant - Condone poor/no notation - Exact fraction or recurring decimal $2.\dot{6}1538\dot{4}$ (if given as a decimal correct dot notation oe must be used) - Ignore y value if seen - isw decimals after correct answer seen

Question 6a

The following comments earn B1

The graph has two roots between 2 and 3 but since the y values and both 2 and 3 are positive, no change in sign will be detected so the student will not find the roots.

The change of sign would go unnoticed between 2 and 3 on the x axis

Both roots are between the positive integers 2 and 3 therefore a change of sign will not be observed.

$x=2$, $f(x) = 0.933$ $x = 3$, $f(x) = 0.147$ so there is no change of sign so no roots determined

The following comments earn B0

Student uses integer which when you use $f(2)$ and $f(3)$ both values are positive therefore it could not be used to locate a root

B0 as no explicit mention of change of sign

As he may skip over the exact moment $f(x)=0$ due to the interval change/resolution of the spreadsheet data.

B0 as change of sign not mentioned or that there are two roots between 2 and 3

She uses integer values the roots are between the integers 2 and 3 the graph $f(x)$ is always positive at these values.

B0 as no explicit mention of change of sign or 2 roots

It has 2 roots.

B0 as no explicit mention of change of sign or 2 roots between integers 2 and 3

Because there is a $\ln$ term in the equation.

B0 as no mention of change of sign or 2 roots

The student might miss an x value that correlates to $f(x)=0$

B0 as no mention of change of sign or 2 roots between 2 and 3.