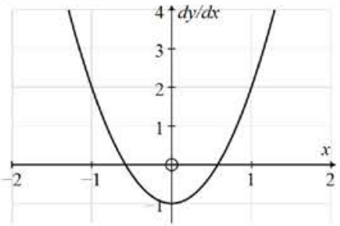
Question			Answer	Marks	AOs		Guidance
12	(a)		$\dfrac{f(x+h)-f(x)}{h}=\dfrac{(x+h)^3-(x+h)-(x^3-x)}{h}$ $=\dfrac{x^3+3hx^2+3h^2x+h^3-x-h-(x^3-x)}{h}$ $=\dfrac{3x^2h+3xh^2+h^3-h}{h}=3x^2+3xh+h^2-1$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to 0}(3x^2-1+3xh+h^2)=3x^2-1$	**M1** **A1** **M1** **E1** **[4]**	**2.1** **2.1** **2.1** **2.1**	Substituting into $\dfrac{f(x+h)-f(x)}{h}$ and attempt to expand $(x+h)^3$ Correct expansion of $(x+h)^3$ Simplifying the fraction to eliminate a denominator Must include the idea of limit as h tends to zero AG	Allow correct 6 terms not simplified
12	(b)			**B1** **B1** **(dep)** **[2]**	**1.1a** **1.1**	Correct shape with vertex on the negative y-axis (0, -1) labelled and an indication the graph crosses the x-axis at $\left(\pm\dfrac{1}{\sqrt{3}}, 0\right)$	Allow without $\pm\dfrac{1}{\sqrt{3}}$ if clear that the points are between $(-1, 0)$ and $(1, 0)$
12	(c)		Point of inflection when $f''(x)=0$ $f''(x)=6x=0$ has only one root $x=0$ When $x=0$, $f'(x)=-1\neq 0$ so the point of inflection is not a stationary point.	**M1** **A1** **E1** **[3]**	**2.1** **2.1** **2.1**	Equating their second derivative to zero Must explain that this is the only point of inflection Must prove that the point is not stationary from correct value for $f'(0)$	Also allow if shown that the stationary points are at $\left(\pm\dfrac{1}{\sqrt{3}}, 0\right)$