QUESTION 7.1

(a) 30 ***(A1)*** ***[1 mark]***

(b) $f'(x) = 3x^2 - 6x - 24$ ***(A1)(A1)(A1)*** ***[3 marks]***

Note: Award ***(A1)*** for each term. Award at most ***(A1)(A1)*** if extra terms present.

(c) $f'(1) = -27$ ***(M1)(A1)*(ft)(G2)*** ***[2 marks]***

Note: Award ***(M1)*** for substituting $x = 1$ into their derivative.

(d) (i) $f'(x) = 0$

$3x^2 - 6x - 24 = 0$ ***(M1)***

$x = 4;\ x = -2$ ***(A1)*(ft)(A1)*(ft)**

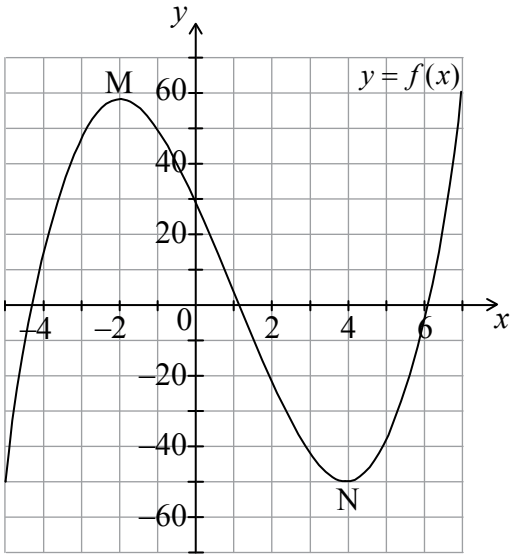
Notes: Award ***(M1)*** for either $f'(x) = 0$ or $3x^2 - 6x - 24 = 0$ seen.
Follow through from their derivative.
Do not award the two answer marks if derivative not used.

(ii) $\mathrm{M}(-2, 58)$ accept $x = -2,\ y = 58$ ***(A1)*(ft)**

$\mathrm{N}(4, -50)$ accept $x = 4,\ y = -50$ ***(A1)*(ft)*** ***[5 marks]***

Note: Follow through from their answer to part (d) (i).

(e)



(A1) for window
(A1) for a smooth curve with the correct shape
(A1) for axes intercepts in approximately the correct positions
(A1) for M and N marked on diagram and in approximately correct position ***(A4)*** ***[4 marks]***

Note: If window is not indicated award at most ***(A0)(A1)(A0)(A1)*(ft)**.

continued…

Question 7.1 continued

(f) (i) $3x^2 - 6x - 24 = 21$ ***(M1)***

$3x^2 - 6x - 45 = 0$ ***(M1)***

$x = 5;\ x = -3$ ***(A1)*****(ft)*****(A1)*****(ft)*****(G3)***

Note: Follow through from their derivative.

OR

Award ***(A1)*** for L_1 drawn tangent to the graph of f on their sketch in approximately the correct position $(x = -3)$, ***(A1)*****(ft)**

(A1) for a second tangent parallel to their L_1, ***(A1)*****(ft)**

(A1) for $x = -3$, ***(A1)*** for $x = 5$. ***(A1)(A1)***

Note: If only $x = -3$ is shown without working award ***(G2)***. If both answers are shown irrespective of working award ***(G3)***.

(ii) $f(5) = -40$ ***(M1)(A1)*****(ft)*****(G2)*** ***[6 marks]***

Notes: Award ***(M1)*** for attempting to find the image of their $x = 5$.
Award ***(A1)*** only for $(5, -40)$.
Follow through from their *x*-coordinate of B **only if it has been clearly identified** in (f) (i).

Total [21 marks]