Question	Scheme	Marks	AOs
1	$\mathrm{f}(1) = a(1)^3 + 10(1)^2 - 3a(1) - 4 = 0$	M1	3.1a
	$6 - 2a = 0 \Rightarrow a = ...$	M1	1.1b
	$a = 3$	A1	1.1b
		(3)	
			(3 marks)

Notes

Main method seen:

M1: Attempts f (1) = 0 to set up an equation in a It is implied by $a + 10 - 3a - 4 = 0$

Condone a slip but attempting f (–1) = 0 is M0

M1: Solves a linear equation in a .

Using the main method it is dependent upon having set f (±1) = 0

It is implied by a solution of $\pm a \pm 10 \pm 3a \pm 4 = 0$.

Don't be concerned about the mechanics of the solution.

A1: a = 3 (following correct work)

....

Answers without working scores 0 marks. The method must be made clear. Candidates cannot guess. However if a candidate states for example, when $a = 3$, $\mathrm{f}(x) = 3x^3 + 10x^2 - 9x - 4$ and shows that $(x - 1)$ is a factor of this $\mathrm{f}(x)$ by an allowable method, they should be awarded M1 M1 A1

E.g. 1: $3x^3 + 10x^2 - 9x - 4 = (x - 1)(3x^2 + 13x + 4)$ Hence $a = 3$

E.g. 2: $\mathrm{f}(x) = 3x^3 + 10x^2 - 9x - 4$, $\mathrm{f}(1) = 3 + 10 - 9 - 4 = 0$ Hence $a = 3$

The solutions via this method must end with the value for a to score the A1

....

....

Other methods are available. They are more difficult to determine what the candidate is doing.
Please send to review if you are uncertain
It is important that a correct method is attempted so look at how the two M's are scored

Amongst others are:

Alt (1) by inspection which may be seen in a table/g

	ax^2	$(10+a)x$	4
x	ax^3	$(10+a)x^2$	$4x$
-1	$-ax^2$	$-(10+a)x$	-4

$ax^3+10x^2-3ax-4=(x-1)\left(ax^2+(10+a)x+4\right)$ and sets terms in x equal

$-3a=-(10+a)+4 \Rightarrow 2a=6 \Rightarrow a=3$

M1: This method is implied by a **correct** equation, usually $-3a=-(10+a)+4$

M1: Attempts to find the quadratic factor which must be of the form $ax^2+\mathrm{g}(a)x\pm 4$ and then forms and solves a linear equation formed by linking the coefficients or terms in x

....

Alt (2) By division:

$$\begin{array}{r|l} & ax^2+(\pm10\pm a)x+(10-2a) \\ \hline x-1 & ax^3 \quad +10x^2 \qquad -3ax-4 \\ & \underline{ax^3-ax^2} \\ & \qquad (10+a)x^2-3ax \\ & \qquad \underline{(10+a)x^2-(10+a)x} \\ & \qquad\qquad (-2a+10)x \end{array}$$

M1: This method is implied by a **correct** equation, usually $-10+2a=-4$

M1: Attempts to divide with quotient of $ax^2+(\pm10\pm a)x+\mathrm{h}(a)$ and then forms and solves a linear equation in a formed by setting the remainder = 0.