10.
$$f'(x) = 6x^{2} + 18x - 24$$

$$6x^{2} + 18x - 24 < 0$$

$$x^{2} + 3x - 4 < 0$$

$$(x + 4)(x - 1) < 0$$

NUMBER



Question		n	Generic scheme	Illustrative scheme	Max mark
10.			 Method 1 differentiate one term complete differentiation and interpret condition determine zeros of quadratic expression state range with justification 	Method 1 • 1 6 x^{2} or +18 x or -24 • 2 6 x^{2} +18 x -24 < 0 • 3 1 and -4 • 4 -4 < x < 1 with eg labelled sketch	4
			Method 2 •¹ differentiate one term •² complete differentiation and determine zeros of quadratic expression •³ construct nature table(s)	Method 2 • 1 6 x^{2} or +18 x or -24 • 2 6 x^{2} +18 x - 24 and 1 and -4 • 3 $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	4
			• 4 interpret sign of derivative and state range	•4 decreasing when $f'(x) < 0$ so $-4 < x < 1$	

Notes:

- 1. At \bullet^3 do not penalise candidates who fail to extract the common factor or who have divided the quadratic inequality by 6.
- and •⁴ are not available to candidates who arrive at a linear expression at •².
 Accept the appearance of -4 and 1 within inequalities for •³.
 At •⁴, accept "x > -4, x < 1" together with the required justification.

Commonly Observed Responses:							
Candidate A $6x^2 + 18x - 24 < 0$ $6x^2 + 18x - 24 = 0$ x = -4, 1 -4 < x < 1 with sketch	•1 • •2 • • • • • • • • • • • • • • • •	Candidate B - no initial inequation $6x^{2} + 18x - 24 = 0$ $x = -4, 1$ $-4 < x < 1 \text{ with sketch}$	·				
Candidate C Decreasing when $f'(x) < 0$ $f'(x) = 6x^2 + 18x - 24$:	• ¹ ✓ • ² ✓	Candidate D - condition applied after simplification $f'(x) = 6x^2 + 18x - 24$ $x^2 + 3x - 4 < 0$ $x = -4, 1$ $-4 < x < 1 \text{ with sketch}$	✓ ^ ✓				